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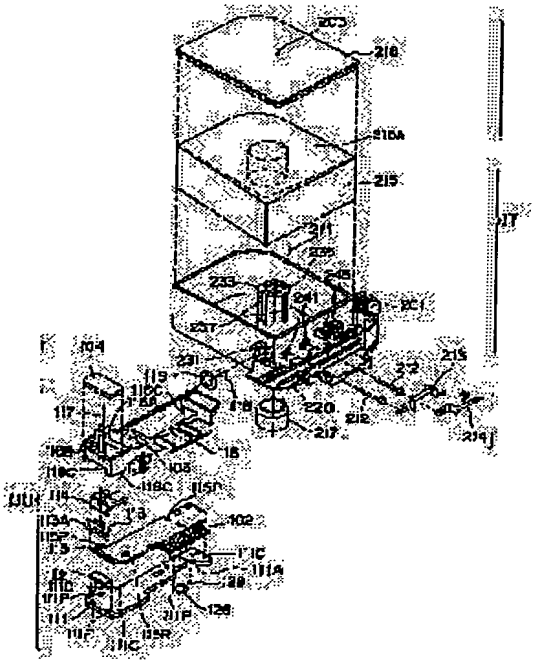
## (54) INK JET RECORDER

(57)Abstract:
PURPOSE: To ensure that high-grade recording is always made by performing appropriate discharge drive control in accordance with a replaced recording head in an ink jet recorder.
CONSTITUTION: A printed circuit board 115 which constitutes a recording head consists of EEPROM 128, in which drive conditions of the recording head and correction data for density irregularities are stored. In addition, data on the use history of a recording head, e.g. the number of printing sheets and the number of discharges is stored and drive conditions are updated in accordance with the history data.



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* NOTICES *



1.This document has been translated by computer. So the translation may not reflect the original precisely.
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CLAIMS

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[Claim(s)]
[Claim 1] In the ink jet recording device which records on recorded media by breathing out ink It is the recording head with which said equipment is equipped free [ attachment and detachment ]. The recording head concerned each Drive historical data, In said memory of the recording head which memorized at least one of wearing condition data, recovery data, drive condition data, and the concentration unevenness amendment data, and was equipped with the memory in which the writing and call of these data are possible, and this recording head The ink jet recording device characterized by having the memory write / a read-out means to perform the writing or read-out of said data to predetermined timing, and the drive control means which drives said recording head based on the data which this memory write / read-out means read.
[Claim 2] Said recording head is an ink jet recording device according to claim 1 characterized by equipping one with the ink tank which stored the ink supplied to the recording head concerned.
[Claim 3] Said recording head is an ink jet recording device according to claim 1 characterized by having had the ink tank which stored the ink supplied to the recording head concerned really and disengageable, and preparing said memory in a recording head at least.
[Claim 4] Said recording head is an ink jet recording device according to claim 1 to 3 characterized by making ink produce air bubbles using heat energy, and carrying out the regurgitation of the ink based on generation of these air bubbles.

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[Translation done.]

* NOTICES *



## DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the ink jet recording device which can use a recording head removable to the body of equipment in detail about an ink jet recording device.
[0002]
[Description of the Prior Art] In this kind of equipment, when a recording head is detached and attached, recording heads may mainly be exchanged [ ****** ]. In such a case, the recording head with which it is equipped is a new intact thing.
[0003] However, even when exchanged in a recording head, that with which it is equipped may already be used. For example, the recording head which demounted while not using prolonged equipment, when using the recording head currently used with other equipments of the same model may be used again. Moreover, it uses at a time two or more one recording head from which the color of ink and concentration differ, respectively, equipping, and the case of being above arises also in a recording device recordable by various colors etc.
[0004] As a configuration which makes exchange of the above recording heads comparatively easy, there are what fabricated the recording head and the ink tank to one, a thing mutually made disengageable even if it was one, and it is the configuration which an ink jet recording device may be used for, and is adopted in recent years.
[0005]
[Problem(s) to be Solved by the Invention] By the way, when the recording head for which it was exchanged is already used as mentioned above, by the busy condition of the recording head till then etc., the regurgitation drive of the recording head by the body side of equipment does not suit, and the good ink regurgitation may be unable to be performed. For example, the heat generation characteristic may be changing with drives till then, or the property of the regurgitation heater of a recording head itself of having been exchanged in the regurgitation heater which generates the heat energy used for the ink regurgitation may be changing. In such a case, when the body side of equipment drove the regurgitation heater by the same driving pulse even as it, the good regurgitation was not performed, consequently the grace of a record image might be spoiled.
[0006] This invention is made in view of an above-mentioned trouble, and the place made into the purpose is by performing suitable regurgitation drive control according to the recording head for which it was exchanged to offer the ink jet recording device which can perform high-definition record which does not perform the always good ink regurgitation.
[0007]
[Means for Solving the Problem] Therefore, it sets to the ink jet recording device which records on recorded media by breathing out ink in this invention. It is the recording head with which said equipment is equipped free [ attachment and detachment ]. The recording head concerned each Drive historical data, In said memory of the recording head which memorized at least one of wearing condition data, recovery data, drive condition data, and the concentration unevenness amendment data, and was equipped with the memory in which the writing and call of these data are possible, and this recording head It is characterized by having the memory write / a read-out

means to perform the writing or read-out of said data to predetermined timing, and the drive control means which drives said recording head based on the data which this memory write / read-out means read.

[0008]

[Function] According to the above configuration, by reading data from the recording head for which it was exchanged, a regurgitation drive can be performed based on the busy condition of the recording head till then, or the updated amendment data of a proper, and the suitable regurgitation becomes possible.

[0009]

[Example] Hereafter, the example of this invention is explained to a detail with reference to a drawing.

[0010] Example 1 drawing 1 starts one example of this invention, and the example of 1 configuration of the record head cartlidge which constituted the recording head and the above-mentioned ink tank in one is shown. The cartridge concerning this example has the ink tank unit IT and the head unit IJU in one, and these can be mutually detached and attached now. The wiring connector 102 for outputting an ink residue detection signal, while receiving the signal for driving the ink discharge part 101 of a head unit etc. is formed in the location on a par with the head unit IJU and the ink tank unit IT. Therefore, in the posture taken when the below-mentioned carriage is loaded with this cartridge, while being able to make that height H low, thickness of a cartridge can be formed into a thin form. When arranging a cartridge side by side so that this may mention later per drawing 3 , it is possible to constitute carriage small. In wearing on the carriage of a head cartlidge, the tongue 201 which established the discharge part 101 in the ink tank unit IT in the condition of having turned down can be grasped, and it can arrange on carriage. This tongue 201 engages with the lever prepared in the below-mentioned carriage for performing wearing actuation of a cartridge. And the pin prepared in the carriage side at the time of the wearing engages with the pin engagement section 103 of the head unit IJU, and positioning of the head unit IJU is made.

[0011] The absorber 104 for cleaning the member which carries out wiping of the front face of the ink discharge part 101 to the head cartlidge concerning this example, and cleans this is juxtaposed in the ink discharge part 101. moreover, the atmospheric-air free passage opening 203 which introduces air with ink consumption — the ink tank unit IT — it is mostly prepared in the center.

[0012] Drawing 2 is the decomposition perspective view of the head cartlidge shown in drawing 1 . The head cartlidge concerning this example consists of the head unit IJU and the ink tank unit IT, and is explained about the detailed configuration of these units using this Fig. etc.

[0013] The base plate 111 formed with aluminum etc. serves as criteria of mounting of the component part of the head unit-head unit IJU, the substrate 112 in which the elements for generating the energy used for the ink regurgitation on it were formed, and the printed circuit board (PCB) 115 with wiring for supplying power to a component etc. are mounted, and these are connected by wirebonding etc. The electric thermal-conversion component which generates the heat energy which makes ink produce film boiling as said component according to energization is prepared in the substrate 112. And below, this substrate 112 is called a heater board.

[0014] The wiring connector 102 mentioned above makes a part of PCB115, and the driving signal from a non-illustrated control circuit is received by the wiring connector 102, and is supplied to the heater board 112 through PCB115. PCB115 is a double-sided wiring substrate in this example, and EEPROM128 and the capacitor 129 which memorized the historical data of the recording head later mentioned about the example of this invention besides being the information on a head proper, for example, the suitable drive conditions of an electric thermal-conversion component, an ID number, ink color information, the data for drive condition amendment (head shading (HS) data), an PWM control condition, etc. are arranged.

[0015] illustration — like — EEPROM128 and a capacitor 129 — a plane-of-composition side with the base plate 111 of PCB115 — and it is arranged in the location corresponding to notch 111A of a base plate 111. By this, if the height at the time of wearing of EEPROM etc. is below the thickness of a base plate 111, IC etc. does not project from a front face at the time of

junction to PCB115 and a base plate 111. It becomes unnecessary therefore, to take into consideration the receipt mode corresponding to those protrusions in a production process.
[0016] The top plate 113 which has a crevice for forming the liquid route group which opens for free passage the common liquid room which stores the ink supplied from the ink tank unit IT side temporarily and this liquid room, and a delivery on the heater board 112 is arranged. Moreover, delivery formation member (orifice plate) 113A which formed the ink delivery in this top plate 113 is formed in one. 114 is a pressure spring for constituting a discharge part 101 by sticking a top plate 113 and the heater board 112.
[0017] 116 is head unit covering and, in addition to this, is a member which comes to carry out mold molding of ink passage 116B for performing an ink free passage with ink supply pipe section 116A which advances into the ink tank unit IT, this, and a top-plate side ink installation tube part, three-point positioning to a base plate 111 or three pin 116C for immobilization, the pin engagement section 103, the anchoring section of an absorber 104, and the required part at one. The passage lid 117 is arranged to ink passage 116B. Moreover, while air bubbles and the filter 118 for dust removal are arranged, the O ring for the ink leakage control from a bond part is arranged at the tip of ink supply pipe 116A.
[0018] In assembling the above head unit, pin 111P which protruded on the base plate are inserted in through tube 115P prepared in PCB115, make and position, and fix both by adhesion etc. In these both immobilization, precision is not required so much. a base plate 111 — receiving — precision — the heater board 112 with which it should be equipped highly is because it is fixed to another object in PCB115.
[0019] Next, the heater board 112 is arranged and fixed with a precision sufficient on a base plate 111, and required electrical installation is performed between PCBs115. And after performing arrangement of a top plate 113 and a spring 114 and performing adhesion and the closure if needed, it positions by inserting in hole 111C of a base plate 111 three pin 116C which protruded on covering. Then, a head unit is completed by carrying out heat weld of these three pin 116C.
[0020] In ink tank unit drawing 2 , an ink absorber for the ink container with which 211 makes the body of an ink tank unit, and 215 to infiltrate ink, the electrode pin for [ 216 ] ink residue detection in an ink tank lid and 212, and 213 and 214 are the contact members about a pin 212.
[0021] The ink container 211 has the tubed part 233 of the hollow mostly set up in the center from the drawing 6 insole side side while it is pinched in the part 220 for equipping with the head unit IJU which the pin 212 and the contact member 213,214 attached and mentioned above in general, the feed hopper 231 which receives penetration of ink supply pipe section 116A, and a list and has 201 in one. This ink container can be formed by one molding of resin.
[0022] The base side of a tubed part 233 takes into consideration like an ink packer, is opened wide, and after restoration, the cap 217 shown in drawing 2 is attached, and it is blockaded to atmospheric air. On the other hand, among drawing 2 , the slot 235 made into a whirl or the meandering configuration is established in the upper limit side (the example of illustration whirl), and puncturing which leads to the building envelope of a tubed part 233 in end 235A (the example of illustration core of a whirl slot) of the slot is prepared in it. Moreover, other end 235B of the slot is located in the part of the atmospheric-air free passage opening 203 established in the tank lid 216.
[0023] Two or more slots (the example of illustration 4) 237 prepare in the side face of a tubed part 233 with equiangular, and it is open for free passage with the building envelope of a **** cage and a tubed part 233. Thereby, a free passage with the interior of an ink tank unit and atmospheric air minds the building envelope of the atmospheric-air free passage opening 203, the whirl slot 233, and a tubed part 233, and a slot 237. And the building envelope of a tubed part 233 functions as the buffer section for preventing the ink leakage by vibration or rocking. Moreover, since the whirl slot 233 which lengthens the path which results in the atmospheric-air free passage opening 203 exists, ink leakage will be prevented much more effectively.
[0024] Moreover, by having had equiangular in the side face of the tubed part 233 of an ink tank mostly located in the center, and having established two or more slots 237 in it like this example, a balance condition with the equalized atmospheric air is secured to the absorber 215 located in

the perimeter, and local concentration of the ink in an absorber can be prevented. This can also secure the supply nature of smooth ink to the absorber compression region (circumference of a feed hopper 231) mentioned later.

[0025] In addition, this slot 237 is formed over the range which includes completely the range A where it extends even more below than the core of the thickness of a container, and a feed hopper 231 exists. Moreover, it is formed in the range also in consideration of the location of the pin 212 for residue detection, an equal ink existence condition or an atmospheric-air free passage condition can be secured in the perimeter of a pin's existence part by this, and the precision of residue detection can be improved.

[0026] Hole 215A which receives insertion of a tubed part 233 is prepared in the absorber 215 for ink sinking in concerning this example. An ink residual does not arise in a part for that compression zone with high negative pressure, without compressing an absorber 215 into a tubed part 233 by having made the tubed part 233 located in this hole 215A. On the other hand, the absorber 215 concerning this example serves as the configuration where the part located in a feed hopper 231 swelled a little, to the configuration (the alternate long and short dash line in drawing 2 shows) of the space formed with the ink tank lid 216 and the ink container 211. Since it will be in the condition that the swollen part was compressed, by this when an absorber 215 is contained in an ink tank unit, in the part, negative pressure becomes high, therefore an absorber 215 can introduce ink to a feed hopper 231 side smoothly.

[0027] Drawing 3 shows the outline perspective view of an ink jet recording device which used the above-mentioned record head cartlidge. This equipment is black (Bk) about the record head cartlidge of ink tank one apparatus exchangeable as mentioned above. It is the printer of the full color serial type which it had corresponding to the ink of (Cyanogen C) (Magenta M) (yellow Y) 4 color. The heads used for this printer are resolution 400dpi and 4kHz of drive frequencies, and have 128 deliveries.

[0028] In drawing 3 , IJC(s) are four record head cartlidges corresponding to each ink of Y, M, C, and Bk, and the recording head and the ink tank which stored the ink which supplies ink to this are formed in one. It is equipped with each record head cartlidge IJC free [ attachment and detachment ] by the non-illustrated configuration to carriage. Carriage 82 is connected to some driving belts 852 which are engaged possible [ sliding ] in accordance with the guide shaft 811, and move by the non-illustrated horizontal-scanning motor. Thereby, the record head cartlidge IJC becomes movable [ for the scan in alignment with the guide shaft 811 ]. 815,816 and 817,818 are conveyance rollers which extend almost in parallel with the guide shaft 811 in the ****** side of the record section by the scan of the record head cartlidge IJC, and a near side. The conveyance rollers 815,816 and 817,818 are driven by the non-illustrated vertical-scanning motor, and convey recorded media P. These recorded media P conveyed counter the field in which the delivery side of the record head cartlidge IJC was arranged, and constitute a recording surface.

[0029] The field where the cartridge IJC which adjoins the record section by the record head cartlidge IJC is movable is attended, and a recovery system unit is prepared. In a recovery system unit, 8300 is the cap unit prepared respectively corresponding to two or more cartridges IJC which have a recording head, and it can be gone up and down in the vertical direction while being able to slide to the longitudinal direction in drawing with migration of carriage 82. And when carriage 82 is in a home position, it joins to the recording head section and capping of this is carried out. Moreover, in a recovery system unit, 8401 is a blade as a wiping member.

[0030] Furthermore, 8500 is a pump unit for absorbing ink etc. from the delivery of a recording head, and its near through the cap unit 8300.

[0031] Drawing 4 is the diagram showing the relation between the ink residue when passing constant current, and the resistance measured at the **** pin 212,212 in the ink tank mentioned above.

[0032] It makes a lamp turn on noting that the resistance R measured has few ink residues, when larger than a predetermined threshold level value, and a user is told about the amount of ink running short.

[0033] The printing approach of this example using the above-mentioned equipment is explained

below.
[0034] The description is given to the recording head drive approach and the printing approach in this example. The driving method which modulates the pulse width is used for a recording head drive using a division pulse. Drawing 5 shows this division pulse, sets it to drawing, and VOP is driver voltage and P1. A preheating pulse and P2 An interval time and P3 The Maine heat pulse is shown. T1, T2, and T3 A pulse P1, P2, and P3 The time amount for deciding width of face is shown. VOP constitutes electric energy required in order to generate the heat energy used for the regurgitation, and is decided by structure of an ink way where the area of a regurgitation heater, resistance, membrane structure, and a regurgitation heater are formed.
[0035] The division Pulse-Density-Modulation driving method is P1, P2, and P3. A pulse is given in order and it is the preheating pulse P1. The ink temperature in an ink way is mainly controlled. That is, the detection temperature using the temperature sensor of a recording head is embraced, and it is the preheating pulse P1. Pulse width is controlled. However, this pulse P1 He is trying for a foaming phenomenon not to arise by impression. Interval time P2 Preheating pulse P1 The Maine heat pulse P3 In order to prepare spacing of fixed time amount so that a mutual intervention may not be carried out, there is work which equalizes the temperature distribution of the ink in an ink way. The Maine heat pulse P3 It is for generating a foaming phenomenon and making an INKKU drop breathe out from a delivery.
[0036] The recording head of this example is having structure as shown in drawing 6 (A) and (B), and the regurgitation heater 1 is formed on the substrate 5 which consists of silicon etc., and generates heat energy by impressing the above-mentioned division pulse to this. This heat energy generates air bubbles and makes ink breathe out from a delivery 3 while it acts on the ink in the ink way 2 and changes that temperature.
[0037] In the environment of head temperature TH =25.0(degree-C), it is width-of-face =1.867 (microsecondec) of P1, and P3 at the time of VOP=18.0(V). Width of face = if the pulse of 4.114 (microsecondec) is given, the ink discharge condition which became the optimal drive conditions and was stabilized will be obtained. The regurgitation properties at this time are ink discharge quantity VD =30.0 ng/dot and regurgitation rate V=12.0 m/sec. Incidentally, the maximum drive frequency of a recording head is fr=4.0kHz, it has the resolution of 400dpi, divides 128 deliveries into 16 blocks, and carries out a sequential drive for every block.
[0038] Next, preheating pulse P1 The used discharge quantity control is explained.
[0039] head temperature (TH) — preheating pulse P1 in certain conditions Discharge quantity VD Relation is shown in drawing 7 .
[0040] it is shown in drawing — as — preheating pulse P1 The increment in pulse width increases to pulse width P1LMT linearly, and after it, when a pre foaming phenomenon is produced, foaming of the Maine heat pulse P3 is disturbed and it passes over pulse width P1MAX, the inclination for discharge quantity to decrease is shown.
[0041] Next, preheating pulse P1 They are the head temperature TH (environmental temperature) and discharge quantity VD at certain conditions. Relation is shown in drawing 8 .
[0042] As shown in drawing, it is the head temperature TH. Discharge quantity shows the inclination which increases linearly to an increment.
[0043] The multiplier of the field which shows the linearity of drawing 7 and each drawing 8 is [0044], respectively.
[Equation 1]
The preheating pulse dependence multiplier of discharge quantity: Kp=delta VDP/delta P1 (ng/mu s-dot) Head temperature dependence multiplier of discharge quantity : It defines like KT=delta VDT/delta TH (ng/C-dot).
[0045] In the thing of the head structure shown in drawing 6 , it is KP =3.21 (ng/mu sec-dot) and KT =0.3 (ng/mu sec-dot).
[0046] Preheating pulse P1 effectively used so that these two relation might be explained below If it controls, as shown in drawing 9 , even if head temperature changes with various factors, such as fluctuation of environmental temperature, and fluctuation by the self-temperature up by printing, the discharge quantity control which can always keep the ink discharge quantity of a recording head constant will be attained. Hereafter, it explains that drawing 1 is referred to.

[0047] Discharge quantity control becomes what is different on the following three conditions.
[0048] (1) TH <=T0 It solves and discharge quantity compensation at the time of low temperature is performed by the temperature control of a recording head.
[0049] (2) T0 <TH <=TL It solves and discharge quantity control by the division Pulse-Density-Modulation method (henceforth PWM) is performed.
[0050] (3) the time of TL <TH (<TC) — P1 = — carry out by un-controlling [ which is depended uniformly ].
[0051] The conditions of (1) are the head temperature TH by the time of being for mainly securing the discharge quantity in a low-temperature environment in the temperature control field of drawing 9 , and environmental temperature (self-temperature up) being 25.0 degrees C or less. It is TH =T0 by the thing of temperature control temperature T0 =25.0(degree-C) kept constant. He is trying to obtain discharge quantity VDO=30.0 (ng/dot) at the time. T0 It may be 25.0 degrees C for abolishing the evil by ink thickening by temperature control, ink fixing, a temperature control ripple, etc. as much as possible. P1 at this time Pulse width is P1 = 1.867microsec.
[0052] It is carried out while environmental temperature (self-temperature up) is 26.0 degrees C - 44.0 degrees C in the PWM field of drawing 9 , and the table showing change of the self-temperature up by printing or environmental temperature in drawing 10 and drawing 13 based on the temperature which the sensor detected is followed, and the condition of (2) is the preheating pulse P1 every 2.0 degrees C. Width of face is changed. Control follows the sequence shown in drawing 11 .
[0053] Incorrect detection of head temperature is prevented in this sequence. In order to perform more exact temperature detection The temperature which applied and averaged the temperature Tn (step S1) newly detected as the past 3 times of temperature (Tn-3, Tn-2, and Tn-1) is used as head temperature Tn '- (Tn-3+Tn-2+Tn-1+Tn) / 4 (step S2). Head temperature TH =Tn measured at the following step this value TH ' and this time Since a temperature change is within the limits of one table in change of less than **1 degree C in the case of i|deltaT|<1 degree C when a comparative judgment is carried out (step S3) and it is referred to as TH-Tn-1 =deltaT, it is P1. Pulse width is not changed.
[0054] ii) Since deltaT>=1-degree-C temperature change has shifted to an elevated-temperature side, one table is lowered, and it is P1. Pulse width is narrowed.
[0055] iii) Since the deltaT<=-1-degree-C temperature change has shifted to a low temperature side, one table is raised, and it is P1. Pulse width is made large.
[0056] In addition, a table permits only one change also by the case of |deltaT|>=1 degree C.
[0057] ** — it controls, changing a table like. The timing (feedback time) which changes one table during printing is every TF =20msec. Therefore, about 40 table change is attained during printing of one line (about 800 msec(s)), management also to a 19.0 degrees C [ a maximum of ] temperature up is attained, and generating of concentration change is reduced.
[0058] The average is used for temperature detection 4 times for making concentration fluctuation by control into necessary minimum, and it not being conspicuous and carrying out concentration change (connector stripe) by the serial printing method which ties and comes out, while feeding back smoothly by preventing the incorrect detection by the noise of a sensor etc. If this discharge quantity control approach is used, it will become controllable within the limits of **0.6 (ng/dot) to target discharge quantity VDO=30.0 (ng/dot) in the above-mentioned temperature requirement. The concentration fluctuation which will be generated during printing of one sheet of record form if it fits in the discharge quantity fluctuation in within the limits of this is suppressed by about about **0.2, and concentration unevenness remarkable in a serial printing method and a connector stripe do not pose a problem. in addition — if the count of an average of temperature detection is increased — a noise etc. — strong — collapsibility — although it becomes a smooth change, conversely, detection precision is spoiled and exact control becomes impossible in control on real time Moreover, although it will become weak at a noise etc. and an abrupt change will occur if the count of an average of temperature detection is reduced, conversely, by control on real time, detection precision increases and exact control is attained.

[0059] In the condition of (3), if the case where environmental temperature (self-temperature up) is 44.0 degrees C or more although it is non-regulatory region is assumed and DUTY is continuously printed 100% in a printing condition, it will reach momentarily, but the design of head structure and head drive conditions are set up so that it may not always become this temperature. When this condition occurs continuously, it should be judged as an elevated-temperature abnormal condition, and it is coped with by performing recovery action. Moreover, preheating pulse P1 Heating by the preheating pulse is suppressed by setting pulse width to 0.187microsec, and the self-temperature up by printing is reduced as much as possible.
[0060] Next, the sequence of the temperature control in (1) mentioned above is described in detail.
[0061] It controls by this example by the body side using the subheater formed in right and left of a recording head, and its temperature sensor located very much in near.
[0062] The physical relationship of the temperature sensors 10A and 10B of a recording head and the subheaters 11A and 11B which are used for drawing 12 by this example, and the regurgitation heater 1 is shown.
[0063] Detection of temperature is the same as that of the discharge quantity control system in the above (2), and uses 4 times of the averages. At this time, it is the head temperature TH. Temperature TR detected from right-hand side sensor 10B Temperature TL detected from left-hand side sensor 10A The average (TH = (TR+TL)/2) is used. Although a current is passed at the subheater by the side of a head and temperature control is performed with this detection temperature, the control approaches of temperature are ON / off method fundamentally. That is, when a current will be cut if maximum electric power (right and left each 1.2 W) is switched on and target temperature is reached until it reaches target temperature T0 =25.0 degree C, and temperature falls, it is the method which passes a current. Timing of ON/OFF is performed every 40msec(s). If this timing is lengthened, the width of face of a ripple will become large and a period will be prolonged. Moreover, if this timing is shortened, the width of face of a ripple will become small and a period will become short. Although the temperature control ripple width of face in target temperature is about 2 degrees C, since the temperature detection by average is used 4 times with this method, there is almost no effect on the discharge quantity control by the temperature control ripple. As long as there is need, the expensive control approaches, such as PID control, may be used.
[0064] (Driving pulse setup) Next, the setting approach of the drive conditions of the recording head used by this example is explained.
[0065] Since the exchangeable cartridge type which made the ink tank one is used for this example equipment, a user can exchange heads at any time. For this reason, the fine adjustment by a serviceman etc. is not expectable. Moreover, in order to manufacture a cartridge head by mass production method, it has a property peculiar to each head, and the approach of amending the difference in the drive conditioning for every head by the variation on production processes, such as area of a regurgitation heater, resistance, and membrane structure, is needed.
[0066] If drive conditions are not set up for every recording head, turbulence of a remarkable image will occur by the non-regurgitation and kink which are generated during about [ that the image stabilized since a regurgitation rate and a direction (impact precision), discharge quantity (concentration), regurgitation stability (a refill frequency, concentration unevenness, kink), etc. were not rationalized in a regurgitation property is not obtained ], and printing. Moreover, since the whole balance will collapse if it prints by the recording head with a regurgitation property different at least one from standard condition, since it is formed using cyanogen, a Magenta, yellow, and four recording heads of black, a full color image will reduce image quality.
[0067] The regurgitation property variation for every head of this is amended, and the approach for performing optimal image formation is shown below.
[0068] When a power source is switched on, the table number TA 1 is read in EEPROM128 which the recording head mentioned above as drive conditions with an ID number, a color, etc. According to this number TA 1, the value of the width of face of the Maine heat pulse P3 of the division Pulse-Density-Modulation drive controlling method for ******(ing) by the body side is read.

[0069] i) — T1 decision — oh, regurgitation property measurement of each head is performed on the production process of an Ecklonia recording head, the optimal drive conditions for each recording head are defined, and EEPROM of each recording head is made to memorize as information
[0070] ii) At a drive conditioning body side, they are each pulse at the time of a division pulse width drive, the preheating pulse P1, the interval time P2, and the Maine heat pulse P3. In order to set up the time amount from the time of the standup of a preheating pulse As shown in drawing 5 , they are T1, T2, and T3. It carries out, the value of T3 is fixed from the beginning on the body, and it is T2. A value determines P3 (P3 =T3−T2).
[0071] As mentioned above, by reading the table TA 1 for drive conditioning of a recording head as information on EEPROM128 of a recording head, the setups by the side of a body (drive conditions) can be changed, and it enables this to absorb regurgitation property variation for every recording head.
[0072] (HS table set up) Next, a setup of the concentration unevenness amendment (henceforth head shading (HS)) data currently carried out by this example is explained.
[0073] Like the above−mentioned driving pulse setup, in order to amend the concentration unevenness by the discharge quantity variation for every recording head, an ID number, a color, and drive conditions read Table THS in the above EEPROM of a recording head as HS data to a power up. This table THS is copied to predetermined memory by the body side.
[0074] i) — the decision of THS — oh, HS data are calculated by performing diameter distribution measurement of a dot of each head on standard drive conditions on the production process of an Ecklonia head, and what table−ized the count result is memorized as ROM information on a head.
[0075] ii) HS data are read.
[0076] As mentioned above, by reading the table THS for HS data as information on EEPROM128 of a recording head, it enables it to perform unevenness amendment of each head by the body side, and enables this to absorb the concentration unevenness by the discharge quantity variation for every recording head.
[0077] (PWM table set up) Even if it makes it a setup of the PWM table used by the PWM control mentioned above, it carries out similarly.
[0078] That is, the table number TA 3 is read as a control condition of PWM as ROM information on a recording head to a power up with an ID number, a color, the drive conditions concerning two setup mentioned above, and HS data. Preheating pulse [ in / according to this number TA 3 / at a body side / PWM control ] P1 The upper limit of width of face is decided.
[0079] i) — T3 decision — oh, discharge quantity measurement of each head is performed on standard drive conditions on the production process of an Ecklonia recording head, and discharge quantity should boil some — EEPROM128 of a ** rank part opium poppy recording head is made to memorize as information
[0080] ii) In the recording head whose table decision 1. discharge quantity of PWM control increases, the value of the width of face of the preheating pulse P1 at the time of 25.0 degrees C is made shorter than standard drive conditions (width of face of P1 = 1.867microsec), discharge quantity is lessened, and it brings close to the standard discharge quantity VDO.
[0081] 2. At a recording head with little discharge quantity, it is the preheating pulse P1 at the time of 25.0 degrees C. The value of width of face is made longer than standard drive conditions (P1 = 1.867microsec), discharge quantity is made [ many ], and it brings close to the standard discharge quantity VDO.
[0082] 3. The above−mentioned actuation responds to the discharge quantity of each recording head as shown in drawing 10 , and it is a table TA 3 and the preheating pulse P1. It has set up so that relation with width of face may be decided and it may always become the standard discharge quantity VDO.
[0083] 4. It becomes possible to amend the discharge quantity variation of 1.2 [ **] (ng/dot) to the standard discharge quantity VDO (30.0 ng/dot) by this approach.
[0084] As mentioned above, it becomes possible similarly by reading the table TA 3 for PWM control from EEPROM of a recording head to absorb the variation in the discharge quantity for

every recording head by changing the control condition by the side of a body.
[0085] Next, amendment control of the concentration unevenness of the recording head mainly produced by aging, i.e., the amendment control based on a setup of the above-mentioned HS data, is explained.
[0086] A change of state arises gradually and a recording head becomes easy to generate concentration unevenness as a result as it continues record actuation and goes. Therefore, in this example, equipment itself measures the concentration unevenness generated by such aging, and processing in which a correction curve is newly rechosen is performed.
[0087] Positioning of concentration unevenness amendment processing of the recording head by drawing 14 is explained to this example in the flow of a series of image processings. The sensor sensibility is amended in the shading compensation circuit 91, and the picture signal read from the CCD sensor 50 which is one of the fixed image sensors is changed into C (cyanogen), M (Magenta), and Y (yellow) of a color (printing color) in three primary colors from C (cyanogen), M (Magenta), and Y (yellow) of light in three primary colors by the LOG conversion circuit 92. Next, the part of BK (black) is extracted as a common component, or a part of common component is extracted as a part of black component, and C, M, and a Y signal are inputted into the head shading circuit 94 as C, M, Y, and a BK signal. In a head shading circuit, when the picture signal read by CCD50 is recorded in the printer section, gamma amendment (concentration amendment) of is done according to the regurgitation property of a recording head. In the gamma conversion circuit 95, it has several steps of functions for computing the output data to input data, and a suitable function is chosen according to liking of the tint of the concentration balance for every color or a user.
[0088] Moreover, this curvilinear function is determined according to the property of ink, or the property of the recording paper.
[0089] The output of gamma conversion circuit is sent to a binary-ized processing circuit. In this example, the average concentration depending method (the MD method) was adopted. The output of a binary-ized circuit is sent to the printer section 44, and is recorded by the recording head.
[0090] Moreover, the sign 97 in drawing 14 is a concentration unevenness test section, and the actual configuration of the part 100 which doubled the concentration unevenness test section 97 with the head shading circuit 94 is shown in drawing 15 . Moreover, the detailed processing block of this drawing 15 is shown in drawing 16 . Here, the parts enclosed with an alternate long and short dash line are the concentration unevenness test section 97 and the head shading circuit 94, respectively. At this example, the preservation memory 134 and gamma amendment memory 136 are share-ized by one RAM152 temporarily [ concentration unevenness ]. 64 kinds of gamma correction curves shown in drawing 17 are stored in EEPROM126 by the arrangement shown in drawing 18 .
[0091] The flow chart of concentration unevenness amendment processing is shown in drawing 19 .
[0092] If a user judges that concentration unevenness has occurred in the printing image at first, the unevenness amendment carbon button in a control unit (not shown) will be pushed (step S201). Then, a body carries out the printout of the pattern for unevenness measurement as shown in drawing 20 (step S201). Next, a user places this record sample so that the migration direction in the case of printing of a recording head and the migration direction of CCD50 may serve as perpendicular relation on a manuscript base, as shown in drawing 20 (step S203).
[0093] And if an unevenness amendment carbon button is pushed again (step S204), a manuscript read scanner scans the sample pattern of black first (2nd henceforth is performed one by one with cyanogen, a Magenta, and yellow), and it stores in SRAM136 which shows the result to drawing 16 through direct or predetermined processing (step S205).
[0094] It is processing of the average-value circuit 133 indicated to be processing of here predetermined to drawing 16 , and as shown in drawing 21 , it is selectable in the number of sampling data to arbitration. That is, in this example, the average for several sampling minutes of the concentration data of the dot formed of the ink regurgitation from each delivery is calculated, and this result is stored in SRAM136.

[0095] Next, the moving average Dn of 3 pixels which includes 1 pixel for every delivery by CPU approximately as shown in drawing 22 It asks (step S206). However, the method of the average in this case may be a total of 9 pixels in average which contains 4 pixels approximately, and may give weight **** further to each pixel. Next, the average of the 3-pixel average for which it asked at step S206 is calculated (step S207). Next, ratio alphan [%] of the 3-pixel each average for which it asked at step S206, and the value calculated at step S207 (n is a delivery number.) It asks for 1-like 128 less or equals (step S208).
[0096] Processing from step S206 described above to step S208 is performed about the patterns 1-4 of drawing 20 (step S209).
[0097] Next, alphan in each pattern alphan (ave) which asked for and (step S210) asked for average alphan (ave), and current concentration amendment table number Ti New amendment table number Ti+1 is calculated as follows (step S211).
[0098]
[Equation 2] Ti+ — 1 (n) =Ti (n) + (alphan(ave)-100) — table number Ti+1 newly calculated (n) is written in SRAM136 (step S212).
[0099] Processing from step S205 described above to step S212 is performed about each color (step S213). In case it samples here, corresponding to each pattern of black, cyanogen, a Magenta, and yellow, Green which has the relation of amendment, respectively, red, Green, and a blue filter output are sampled (however, possible [ except Green ] about black).
[0100] However, in this example, as shown in drawing 23 , when the non-regurgitation has occurred in the recording head of one ink color of the sampling data incorporated to SRAM136, canceling subsequent data processing etc. is performing how many kinds of those malfunction detection.
[0101] As mentioned above, by this example, when exchanged in a recording head, to writing and subsequent aging, the data of SRAM136 are updated for HS data (gamma amendment data) of EEPROM in a recording head according to the above-mentioned actuation to SRAM136, so that clearly. Furthermore, the data of EEPROM128 of a head are updated. Therefore, in this example, the updated data transmitted the newest HS data to RAM in a printer control section (not shown), and have backed up this RAM by the cell so that it may memorize also at the time of power-source OFF.
[0102] With the equipment of this example which performs data processing which was explained above, and printing processing, it is related with the recording device (printers, such as a copying machine and FAX) which performs full color printing by equipping a body with four record head cartlidges (four colors).
[0103] As mentioned above, EEPROM128 is formed in the record head cartlidge, and various data which were beforehand mentioned above are stored in this. These data are the things of the proper of the recording head, and are automatically read to the predetermined timing at the time of power-source ON of a body etc.
[0104] The drive of a body and a recording head is controlled by this data the optimal, and stable high-definition record is enabled.
[0105] However, the condition in early stages of this head changes every moment by using these heads. Therefore, the contents to control also change in connection with it. Then, according to this invention, the optimal control in the time of the recording head is attained by updating and adding the data of a head to predetermined timing.
[0106] It lists by carrying out the timing and effectiveness of the contents of data, and its writing below in a table.
[0107]
[Table 1]

| データ | 書込みタイミング | 効　果 |
|---|---|---|
| 印字枚数 | 印字後 | 記録ヘッドの寿命、インクタンクの残量、ＨＳのタイミングの推定 |
| 吐出数 | 印字後、予備吐出後 | 記録ヘッドの寿命、インクタンクの残量、ＨＳのタイミングの推定 |
| 吸引回数 | 吸引後 | 吸引量、インクタンク内のインク分布の推定 |
| ワイピング回数 | ワイピング後 | 記録ヘッドのヨレの程度を推定できる |
| インク残量 | 印字後、吸引後 | カートリッジの交換時期がわかる |
| インク残検値 | 印字後、電源オン時吸引後 | インクタンク内のインク残量がわかる |
| ＨＳデータ | ＨＳ処理時 | 記録ヘッドの濃度むらを補正する |
| 本体装着時間 | 本体装着時 | 記録ヘッドの有効期間がわかる |
| 最後の印字時間 | 印字後、電源オン時 | 記録ヘッドが吐出しないで放置された時間がわかる |
| 駆動条件 | 印字後、吸引後、残検動作後、ＨＳ処理後 | 最適な吐出が可能 |

[0108] ****** [ the number of them / the above-mentioned data may also write all in and / one ]. Moreover, some combination is sufficient and the situation of a head cartlidge can be judged more to accuracy with two or more data.
[0109] Hereafter, each data written in the account of a top is explained.
[0110] (Printing number of sheets) The timing of HS processing by concentration unevenness property change of the life of the recording head stated below by total printing number of sheets, an ink residue, and a recording head etc. is known.
[0111] Moreover, the life of a recording head can be roughly presumed by total printing number of sheets. Although the life of the heater by the number of total regurgitation is closer to a recording head life in fact, since a load is given to the hardware and software of the body of equipment, by carrying out the multiplier of the printing number of sheets, counting all the numbers of total regurgitation for every delivery does not give a load, but it can fully presume a life.
[0112] Furthermore, since the consumption of ink can be presumed by total printing number of sheets, the ink residue in an ink tank can be presumed. Since an ink residue is detectable by measuring the electric resistance of the ink in an ink tank, it becomes accuracy more detectable by using together.
[0113] If the recording head is used, since the discharge quantity for every delivery will change delicately, if a certain amount of number of sheets is printed, unevenness will arise in printing. Then, if a certain fixed number of sheets is printed, concentration unevenness can be abolished by urging head shading (HS), and stable image quality can be maintained.
[0114] In addition, head shading by the user cannot be carried out but can also be performed automatically. Moreover, if the number of sheets printed after HS is known, prediction of the concentration unevenness property of a recording head will still be attained. What is necessary is just to perform once timing which writes data in a recording head after printing termination.
[0115] Thus, various kinds of decision is attained by making the data of printing number of

sheets record on a recording head. When there is a case so that especially a recording head may be exchanged, it is not based on an equipment difference, but the condition of a recording head is grasped, and the optimal control is attained.

[0116] (The number of regurgitation) If the number of regurgitation of a recording head is known, it will become possible to grasp the condition of a recording head quite correctly. Specifically, they are the life of a recording head, change of a concentration unevenness property, the consumption of ink, etc.

[0117] The timing which inputs data into a recording head is good for carrying out during printing to count the number of regurgitation while printing one sheet by the memory by the side of a body once not much preferably, and to add to the last number of regurgitation and to rewrite after printing.

[0118] Since it becomes possible [ grasping the condition of a recording head more correctly ] for it to be the number of regurgitation for every delivery as the number of regurgitation said here, are desirable, but even if it is the number of regurgitation of the whole recording head, it is not necessary to become possible to grasp the condition comparatively correctly, and to consume an excessive memory area. Moreover, if the number of regurgitation after HS processing is known, prediction also of the timing to which HS processing is urged will be attained easily.

[0119] (Count of suction) If the count of suction is known, ink consumption and the ink distribution in an ink tank can be guessed.

[0120] Since the amount of ink consumed by one suction actuation is known, if the count is known, it knows the ink of which was consumed. Then, the ink residue in an ink tank can be understood by combining with the amount of ink consumed by printing, and thinking.

[0121] By the way, since the flow of ink is comparatively early, suction changes compared with printing usual in distribution of the ink in an ink tank. That is, from ink, in case air is inhaled from atmospheric-air free passage opening to pulling out ink from a delivery at the time of suction, and coincidence, since the air of passage resistance is smaller, air mixes in the ink absorber in an ink tank, and the slightly usable amount of ink decreases. Therefore, since a substantial ink residue is known if the count of suction is known, more exact residue detection can be carried out. The timing to write in is easy to be after suction actuation.

[0122] (Count of wiping) In order for wiping to clear the condition that the recording head front face got wet and to make it stabilize for it and breathe it out from a delivery, it is the need, but if a count increases, a discharge direction gets twisted as the evil. Although it is a delicate change in fact, if wiping increases in connection with it when printing number of sheets increases considerably, the concentration unevenness in a recording head will change with the increases which get twisted. Then, if the count of wiping is known, it will become possible to guess the timing of HS (head shading).

[0123] Moreover, as a cause of the increase which gets twisted, if the count of wiping increases, it turns out that the water repellence on the front face of a recording head (orifice side) deteriorates, and the life of a recording head can be known. The timing which writes data in a recording head is good after wiping.

[0124] (Ink residue) When printing and recovery action are performed, this data makes the last data subtract and is written in. The ink residue in an ink tank can be known and the exchange stage of a cartridge can be told.

[0125] (Ink **** value) Since it depends for the **** value on the electric resistance of ink, a value will become large if it generally becomes low temperature. Therefore, the threshold voltage value of **** is changed according to the temperature of ink, and the ink residue is detected. Then, more exact residue detection is attained by comparing with the last **** value at the time of **** actuation. The timing to write in is easy to be after **** actuation.

[0126] (HS data) Head shading is performed in order to amend the concentration unevenness property of a recording head and to raise image quality. Although it carries out at first at the time of a recording head outgoing inspection and being written in EEPROM in a recording head, when concentration unevenness has changed while using it, a user is made to perform HS processing suitably. HS data are newly then written in EEPROM of a recording head.

[0127] Moreover, the timing of HS processing may be judged by a count and the number of regurgitation after performing the last HS processing, or the count of suction, may be demanded from a user, and may be performed automatically.
[0128] (Body wearing time amount) When a body is equipped with a head cartlidge for the first time, the time of day within a body is written in. A user can be told, when time difference with a body side timer is calculated suitably and the shelf-life of a cartridge is exceeded.
[0129] Moreover, you may also write the total time amount by the side of the body with which it is equipped in timely. Thereby, even if the passage of time of the timer within a body becomes a defect by a certain cause, data do not change.
[0130] (The last printing time amount) If the time amount printed at the end is known, it is turned out which was left without printing the recording head. If neglect time amount is known, it will become possible to change the conditions of recovery action, such as reserve regurgitation and suction, appropriately. The timing written in a recording head is easy to be after printing termination. Moreover, this may be after reserve regurgitation termination. In this case, what is necessary is just to write in, after the reserve regurgitation finishes. However, it is more desirable not to perform writing, since writing in after the reserve regurgitation under printing has evils, such as to delay printing time amount.
[0131] (Drive conditions) At the time of shipment of the pulse width and the recording head which are added to the recording head at the time of making ink breathe out from a recording head, drive conditions inspect the optimal value for each recording head, and write it in in a head. However, drive conditions may change with the busy conditions of a recording head. For example, since the negative pressure by the absorber of an ink tank becomes large when there are few ink residues, discharge quantity decreases a little. Then, pulse width can be enlarged and discharge quantity can be increased.
[0132] In this case, the data of a recording head can be rewritten after printing, suction, and **** actuation. Moreover, also when having not used it for a long time, it may change. When HS processing is performed, not only the concentration unevenness of a recording head but the absolute value of concentration is known. Then, since discharge quantity can be guessed from concentration, rewriting at the time of HS processing is also possible.
[0133] Example 2 this example explains the case where a recording head and an ink tank are disengageable cartridges.
[0134] Thus, when a recording head and an ink tank dissociate, if ink is lost, tanks will be exchanged, and since an ink tank can be used repeatedly and it can use to the life of a recording head by one recording head, a running cost becomes cheap.
[0135] In the case of such a head cartlidge, it is good to give both by the side of a recording head and an ink tank above-mentioned memory, but it is necessary to give a recording head side at least.
[0136] The case where record memory is first attached to both is explained.
[0137] In this case, although the data about in KUNTAKU of the data explained in the example 1 should just make the data about a recording head record on an ink tank side separately at a recording head side, there may also be data which were common like the above "body wearing time amount."
[0138] In this case, a recording head remains as it is, and when exchanged only in an ink tank, according to the data of that tank, the data by the side of a recording head are changed. For example, the drive conditions of a recording head are changed according to the data of an ink residue. Hereafter, it lists by making the data write-in contents to EEPROM of a recording head, timing, and each effectiveness into a table.
[0139]
[Table 2]

| データ | 書込みタイミング | 効　果 |
|---|---|---|
| 印字枚数（トータル） | 印字後 | 記録ヘッドの寿命、ＲＨＳのタイミングの推定 |
| 吐出数 | 印字後、予備吐出後 | 記録ヘッドの寿命、ＲＨＳのタイミングの推定 |
| ワイピング回数 | ワイピング後 | 記録ヘッドのヨレの増大を推定できる |
| ＨＳデータ | ＨＳ処理時 | 記録ヘッドの濃度むら特性を補正する |
| 本体装着時間 | 本体装着時 | 記録ヘッドの有効期間がわかる |
| 最後の印字時間 | 印字後、電源オン時 | 記録ヘッドが吐出しないで放置された時間がわかる |
| 駆動条件 | 印字後、吸引後、残検動作後、ＨＳ処理後 | 最適な吐出が可能 |

[0140] ****** [ the number of them / the above-mentioned data may also write all in and / one ]. Moreover, some combination is sufficient and the situation of a head cartlidge can be judged more to accuracy with two or more data. Printing number of sheets and the number of regurgitation write in the total number of the recording heads.
[0141] The data write-in contents to EEPROM prepared in the ink tank, timing, and each effectiveness are listed as a table below.
[0142]
[Table 3]

| データ | 書込みタイミング | 効　果 |
|---|---|---|
| 印字枚数 | 印字後 | インクタンクの残量の推定 |
| 吐出発数 | 印字後、予備吐出後 | インクタンクの残量がわかる |
| 吸引回数 | 吸引後 | 吸引量、インクタンク内のインク分布の推定 |
| インク残量 | 印字後、吸引後 | インクタンクの交換時期がわかる |
| 残検値 | 印字後、電源オン時、吸引後 | インクタンク内のインク残量がわかる |
| 本体装着時間 | 本体装着時 | インクタンクの有効期間がわかる |
| 最後の印字時間 | 印字後、電源オン時 | インクタンクが印字に用いられないで放置された時間がわかる |

[0143] ****** [ the number of them / the above-mentioned data may also write all in and / one ]. Moreover, some combination is sufficient and the situation of an ink tank cartridge can be judged more to accuracy with two or more data. The data written in an ink tank are written in regardless of a head. That is, the data of printing number of sheets and the number of regurgitation are added and written in the memory in a tank.
[0144] As mentioned above, it is disengageable, and in the cartridge which functions in one, a head and an ink tank give storage memory a recording head and ink tank side, respectively, and

write in data from the body of a recording apparatus independently to predetermined timing, respectively.

[0145] It becomes possible to print the high-definition image which became exchangeable [ suitable regurgitation control of a body and a recording head, and an ink tank ], and was stabilized by this according to the hysteresis of a recording head and each ink tank.

[0146] Moreover, since it can use repeatedly within one life of a recording head, being able to exchange an ink tank even if it seldom enlarges an ink tank, a running cost can be made cheap. And since weight of a head cartlidge can be made light by making an ink tank small, a light configuration is attained, torque of the motor which is the source of power of carriage can be made small, and head carriage also becomes possible [ miniaturizing a motor and a power source ].

[0147] Unlike an example 2, the example of three examples has storage memory only by the recording head side, and the case where there is nothing to an ink tank side is shown.

[0148] Hereafter, it lists about the data write-in contents, the timing, and each effectiveness to EEPROM of a recording head.

[0149]

[Table 4]

| データ | 書込みタイミング | 効　果 |
|---|---|---|
| 印字枚数 | 印字後 | 記録ヘッドの寿命、インクタンクの残量、ＨＳ処理のタイミングの推定 |
| 吐出発数（空吐出も含む） | 印字後、空吐出後 | 記録ヘッドの寿命、インクタンクの残量がわかる、ＨＳ処理のタイミングの推定 |
| 吸引回数 | 吸引後 | 吸引量、インクタンク内のインク分布の推定 |
| ワイピング回数 | ワイピング後 | 記録ヘッドのヨレの程度を推定できる |
| インク残量 | 印字後、吸引後 | インクタンクカートリッジの交換時期がわかる |
| 残検値 | 印字後、電源オン時、吸引後 | インクタンク内のインク残量がわかる |
| ＨＳデータ | ＨＳ処理時 | 記録ヘッドの濃度むら特性を補正する |
| 本体装着時間 | 本体装着時 | 記録ヘッドの有効期間がわかる |
| 最後の印字時間 | 印字後、電源オン時 | 記録ヘッドが吐出しないで放置された時間がわかる |
| 駆動条件 | 印字後、吸引後、残検動作後、ＨＳ処理後 | 最適な吐出が可能 |

[0150] ****** [ the number of them / the above-mentioned data may also write all in and / one ]. Moreover, some combination is sufficient and the situation of a more exact head cartlidge can be judged with two or more data.

[0151] (Printing number of sheets) Although the total printing number of sheets of a recording head is written in, when exchanged for a new ink tank, the printing number of sheets in the time is written in the memory by the side of a body. The difference of the data of the printing number of sheets by the side of a recording head and a body shows how many sheets were printed by

the ink tank, and by carrying out like this shows hysteresis, even if there is no memory in an ink tank side.

[0152] However, when the cartridge with which the recording head and ink tank were united may be temporarily exchanged for other heads, since the hysteresis of a tank becomes what different, as the printing number of sheets at the time of exchanging a new tank was written in into the memory of a recording head instead of the memory of a body in fact, it is more desirable than **.

[0153] A judgment whether it was exchanged for a new ink tank can be made with the **** value of the ink tank.

[0154] (The number of from regurgitation) Data are written in by the same view as printing number of sheets.

[0155] (Count of suction) If exchanged for a new ink tank, data are initialized and it adds after that.

[0156] Thus, since the hysteresis of an ink tank can be grasped and controlled only by memory by the side of a recording head even if it does not prepare storage memory in an ink tank side, cost of an ink tank can be made cheap. However, it is more desirable for the recording head and the ink tank to have memory separately like [ in order to carry out control which the memory space by the side of a recording head will become big compared with the case where the ink tank has memory independently, and is more reliable ] the above-mentioned example 2.

[0157] Hereafter, an example of the recording head about this example and an ink tank is explained.

[0158] Drawing 24 and drawing 25 show the record head cartlidge by the side of ink tank one concerning this example. This record head cartlidge is a record cartridge of one apparatus which considered mutually the ink tank which is an ink source of supply, and the recording head chip as the configuration which can be detached and attached freely, and also enables exchange of only an ink tank.

[0159] In drawing 24 , 301 is a recording head body slack recording head chip. Among this head chip 301, 302 is an ink discharge part which carries out the regurgitation of the ink, and has the energy generation component which generates the energy for carrying out the regurgitation of an ink delivery and the liquid ink drop. Moreover, similarly, 303 is a liquid room and is open for free passage to the liquid route in which the energy generation component of the ink discharge part 302 was prepared. Although a thing with an electric thermal-conversion object, a thing with an electric machine conversion object, etc. are used here as a regurgitation energy generation component as an ink discharge part 302, since a manufacturing cost is cheap and high density arrangement of a delivery is possible, the former is used suitably. 304 is the passage for sending ink to the liquid room 303 directly from the ink tank 307. 305 is a filter currently formed by the fine mesh, and in case it sends ink to the recording head chip 301 side from the recording ink reservoir section slack ink tank 307 side, it is prepared in order to remove air bubbles or a contaminant currently mixed in ink.

[0160] In addition, below-mentioned EEPROM30 is formed in some head chips 1.

[0161] 306 is an ink absorber formed in the ink tank 307, for example, can be formed with a porous body, fibrous material, or a continuation pore object. The electrodes 308A and 308B for residue detection for detecting the residue of ink are formed in the ink tank 307, and the ink residue in the ink tank 307 can be detected using this. The hook 310 prepared in the head chip 301 is for being hung on the predetermined part of the ink tank 307, and combining the head chip 301 with the ink tank 307.

[0162] 309 is the release button prepared in the both-sides section of the ink tank 307, and it is possible by carrying out the depression of this to separate easily the recording head chip 301 and the ink tank 307, and to demount them, as hook 310 bends inside and this shows to drawing 25 . If it advances towards the predetermined part of the ink tank 307, and it goes, while hook 310 will bend inside, if the ink tank 307 is set by the predetermined location of the recording head chip 301 when newly attaching the ink tank 307 on the other hand, and this is pressed, and the predetermined part is reached after that, it will return to the original condition according to the spring force, and it will be in a hanging condition, and, thereby, the recording head chip 301

and the ink tank 307 will be combined.
[0163] Since the part shown by the agreement A of the ink absorbers 306 (refer to drawing 24 ) is compressed in the case of this association, it is stuck to the ink absorber 306 and the mesh filter 305. Thus, by being compressed, this part A can attract the ink in which strength and the ink absorber 306 are absorbing that capillary action into this part. It becomes possible not to leave the ink in an ink tank but to supply a recording head 301 side by this. 311 is an atmospheric-air free passage hole for leading air to the ink tank 307.
[0164] Next, the case where the ink tank 307 is exchanged is explained. If the ink in in KUNTAKU 307 decreases in number, air will be incorporated from the atmospheric-air free passage hole 311 prepared in the ink tank 307, and air bubbles will come also into an absorber 306 gradually. If the ink in the ink tank 307 is lost mostly, air bubbles will enter into the part A which is a part with the highest consistency among absorbers 306.
[0165] Although the residue of ink is detected by impressing an electrical potential difference to the electrodes 308A and 308B for residue detection, and on the other hand measuring the electric resistance between these electrodes 308A and 308B, if air bubbles enter into the part A of an absorber 306, electric resistance in the meantime will increase rapidly. Then, an ink residue can come out only according to this increase, and a certain thing can be detected. The warning lamp formed in the body of a recording device in order to urge exchange of the ink tank 307, if this ink residue comes out only and detects a certain thing is made to turn on.
[0166] Also after the display to which it urges exchanging the ink tank 307 is made, it may be recordable using the ink which remained in the interior still for a while. When the part A of an absorber 306 is filled with air bubbles, it becomes impossible however, to record suddenly, since the mesh filter 305 does not let air bubbles pass although the ink is also consumed someday. The recording head chip 301 side is filled with ink at this time. However, ink does not leak from the ink discharge part 302 that air bubbles cannot be incorporated from a filter 305, and by holding the meniscus of ink [ near the delivery of the ink discharge part 302 ]. Moreover, also where the ink tank 307 is removed, ink does not leak from the ink tank 307 according to the capillary force of the ink absorber 306.
[0167] The recording device which records on drawing 26 using the record cartridge shown in drawing 24 and drawing 25 is shown. In this recording apparatus, it becomes possible for the scan space of a recording head to become narrow since the cartridge is small, therefore to miniaturize the whole equipment.
[0168] In drawing 26 , 314 is an ink jet cartridge and the recording head chip 301 and the ink tank 307 combine it. The ink jet cartridge 314 is being fixed by the presser-foot member 341 on carriage 315.
[0169] Carriage 315 is driven by the motor 317 which consisted of stepping motors etc., and can reciprocate to a longitudinal direction along with a shaft 321. Rhine to which a signal and supply voltage are sent is connected to carriage 315 and the recording head chip 301 through the flat cable 316.
[0170] 322 is a wire which transmits the driving force of a motor 317 to carriage 315. 329 is a feed motor for combining with a platen roller 319 and making a record medium 318 convey.
[0171] The ink of the ink tank 307 is lost, when the lamp in which it is shown that there is no ink residue lights up, the presser-foot member 341 is canceled, the ink jet cartridge 314 is taken out from carriage 315, and the recording head chip 301 and the ink tank 307 are separated. It is easy for the recording head chip 301 by exchanging the ink tank 307 for a new thing, and combining with the recording head chip 301 to supply ink again.
[0172] Since the recording head chip 301 side is not filled with ink and air bubbles moreover are not necessarily incorporated with a filter 305 after exchanging the ink tank 307, even if it starts record actuation immediately, there is no inconvenience.
[0173] However, it is desirable to supply ink to Part A by thinking, also when air bubbles have collected on the part A of the ink absorbers 306 contained by the new ink tank 307 (refer to drawing 24 ), and performing recovery action by suction of the fixed force etc. in that case. In addition, since a residue detection lamp may light up when it is in the condition that air bubbles have collected on Part A, when exchanging the ink tank 307, it is desirable to perform residue

detection of ink.
[0174] Since it is the fault by the side of the recording head chip 301, or the life of a head 301 when the poor regurgitation is not recovered, even if the residue detection lamp is not on, namely, the regurgitation of ink becomes poor and moreover performs recovery action, although ink remains in the ink tank 307, the recording head chip 301 is exchanged.
[0175] In this example, since a recording head chip mainly consists of an ink discharge part 302 and a liquid room 303 and ink was supplied in the direct liquid room 303 from the ink tank 307, penetration of the air bubbles to the head chip 301 which the configuration becomes small and easy since the subtank usually formed in a head chip is not used, and relates to this example is also certainly prevented with a filter 305.
[0176] However, although the ink tank 307 was made into the ink source of supply in this example, this may be operated as a subtank and a main ink source of supply may be prepared still more nearly independently.
[0177] Example 4 this example is an example in the case of the case where it is used being exchanged in the tank cartridge of a different color being shown, and equipping only with one recording head on a body.
[0178] When ink tanks are the recording head section and a disengageable configuration, the ink tank of two or more colors may be exchanged and used. If the color of ink before exchanging differs from the color of new ink at this time, it is necessary to perform more suction and reserve regurgitation compared with the case of the same color for color mixture prevention of ink.
[0179] Then, suitable recovery becomes possible by writing the color of ink before exchanging in a recording head, and it becomes possible to prevent consumption of excessive ink and the color mixture of ink.
[0180] In this case, what is necessary is just to be able to recognize the color of an ink tank by the body side by the mechanical configuration, such as attaching a projection to a tank, if it is not necessary to write in other than the data of a color, since it is not necessary to rewrite although it is necessary to also give the data of a color to an ink tank side.
[0181] (in addition to this) In addition, especially this invention is equipped with means (for example, an electric thermal-conversion object, a laser beam, etc.) to generate heat energy as energy used also in an ink jet recording method in order to make the ink regurgitation perform, and brings about the effectiveness which was excellent in the recording head of the method which makes the change of state of ink occur with said heat energy, and the recording device. It is because the densification of record and highly minute-ization can be attained according to this method.
[0182] About the typical configuration and typical principle, what is performed using the fundamental principle currently indicated by the U.S. Pat. No. 4723129 specification and the 4740796 specification, for example is desirable. Although this method is applicable to both the so-called mold on demand and a continuous system On the electric thermal-conversion object which is especially arranged corresponding to the sheet and liquid route where the liquid (ink) is held in the case of the mold on demand By impressing at least one driving signal which gives the rapid temperature rise which supports recording information and exceeds nucleate boiling Since make an electric thermal-conversion object generate heat energy, the heat operating surface of a recording head is made to produce film boiling and the air bubbles in the liquid (ink) corresponding to this driving signal can be formed by one to one as a result, it is effective. A liquid (ink) is made to breathe out through opening for regurgitation by growth of these air bubbles, and contraction, and at least one drop is formed. If this driving signal is made into the shape of a pulse form, since growth contraction of air bubbles will be performed appropriately instancy, the regurgitation of a liquid (ink) excellent in especially responsibility can be attained, and it is more desirable. As a driving signal of the shape of this pulse form, what is indicated by the U.S. Pat. No. 4463359 specification and the 4345262 specification is suitable. In addition, if the conditions indicated by the U.S. Pat. No. 4313124 specification of invention about the rate of a temperature rise of the above-mentioned heat operating surface are adopted, further excellent record can be performed.

[0183] As a configuration of a recording head, the configuration using the U.S. Pat. No. 4558333 specification and U.S. Pat. No. 4459600 specification which indicate the configuration arranged to the field to which the heat operation section other than the combination configuration (a straight-line-like liquid flow channel or right-angle liquid flow channel) of a delivery which is indicated by each above-mentioned specification, a liquid route, and an electric thermal-conversion object is crooked is also included in this invention. In addition, the effectiveness of this invention is effective also as a configuration based on JP,59-138461,A which indicates the configuration whose puncturing which absorbs the pressure wave of JP,59-123670,A which indicates the configuration which uses a common slit as the discharge part of an electric thermal-conversion object to two or more electric thermal-conversion objects, or heat energy is made to correspond to a discharge part. Namely, no matter the gestalt of a recording head may be what thing, it is because it can record now efficiently certainly according to this invention.
[0184] Furthermore, this invention is effectively applicable also to the recording head of the full line type which has the die length corresponding to the maximum width of the record medium which can record a recording device. As such a recording head, any of the configuration which fills the die length with the combination of two or more recording heads, and the configuration as one recording head formed in one are sufficient.
[0185] In addition, this invention is effective also when the thing of a serial type like an upper example also uses the recording head fixed to the body of equipment, the recording head exchangeable chip type to which the electric connection with the body of equipment and supply of the ink from the body of equipment are attained by the body of equipment being equipped, or the recording head of the cartridge type with which the ink tank was formed in the recording head itself in one.
[0186] Moreover, as a configuration of the recording device of this invention, since the effectiveness of this invention can be stabilized further, it is desirable to add the regurgitation recovery means of a recording head, a preliminary auxiliary means, etc. If these are mentioned concretely, a preheating means to heat using the capping means, the cleaning means, the pressurization or the suction means, the electric thermal-conversion object, the heating elements different from this, or such combination over a recording head, and a reserve regurgitation means to perform the regurgitation different from record can be mentioned.
[0187] Moreover, although only one piece was prepared also about the class thru/or the number of a recording head carried, for example corresponding to monochromatic ink, corresponding to two or more ink which differs in an others and record color or concentration, more than one may be prepared the number of pieces. That is, although not only the recording mode of only mainstream colors, such as black, but a recording head may be constituted in one as a recording mode of a recording device or the paddle gap by two or more combination is sufficient, for example, this invention is very effective also in equipment equipped with at least one of each of the full color recording mode by the double color color of a different color, or color mixture.
[0188] Furthermore, in addition, in this invention example explained above, although ink is explained as a liquid It is ink solidified less than [ a room temperature or it ], and what is softened or liquefied at a room temperature may be used. Or by the ink jet method, since what carries out temperature control is common as a temperature control is performed for ink itself within the limits of 30 degrees C or more 70 degrees C or less and it is in the stabilization regurgitation range about the viscosity of ink, ink may use what makes the shape of liquid at the time of use record signal grant. In addition, in order to prevent the temperature up by heat energy positively because you make it use it as energy of the change of state from a solid condition to the liquid condition of ink, or in order to prevent evaporation of ink, the ink which solidifies in the state of neglect and is liquefied with heating may be used. Anyway, ink liquefies by grant according to the record signal of heat energy, and this invention can be applied also when using the ink of the property which will not be liquefied without grant of heat energy, such as that by which liquefied ink is breathed out, and a thing which it already begins to solidify when reaching a record medium. The ink in such a case is good for a porosity sheet crevice or a through tube which is indicated by JP,54-56847,A or JP,60-71260,A also as liquefied or a gestalt which counters to an electric thermal-conversion object in the condition of having been held as

a solid. In this invention, the most effective thing performs the film-boiling method mentioned above to each ink mentioned above.

[0189] Furthermore, in addition, as a gestalt of this invention ink jet recording device, although used as an image printing terminal of information management systems, such as a computer, the gestalt of the reproducing unit combined with others, a reader, etc. and the facsimile apparatus which has a transceiver function further may be taken.

[0190]

[Effect of the Invention] According to this invention, by reading data from the recording head for which it was exchanged, a regurgitation drive can be performed based on the busy condition of the recording head till then, or the updated amendment data of a proper, and the suitable regurgitation becomes possible so that clearly from the above explanation.

[0191] Consequently, it is stabilized and high-definition record is attained.

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[Translation done.]

* NOTICES *



1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

## DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the perspective view of the head cartlidge concerning the 1st example of this invention.
[Drawing 2] It is the decomposition perspective view of the head cartlidge shown in drawing 1 .
[Drawing 3] It is the outline perspective view of the ink jet recording device using the head cartlidge shown in drawing 1 and drawing 2 .
[Drawing 4] It is a diagram for explaining the configuration of the ink residue detection used in the 1st example of this invention.
[Drawing 5] It is the typical wave form chart showing the division pulse for the head drive used in the 1st example of the above.
[Drawing 6] (A) — and (B) shows the structure of the recording head used in the 1st example of the above — they are each typical drawing of longitudinal section and a typical front view.
[Drawing 7] It is the diagram showing the relation between the width of face of the pre pulse of the above-mentioned division pulse, and the discharge quantity of a recording head.
[Drawing 8] It is the diagram showing the relation of the environmental temperature and discharge quantity in the recording head of the 1st example of the above.
[Drawing 9] It is drawing for explaining the discharge quantity control in the 1st example of the above, and is the diagram mainly showing the relation between recording head temperature and discharge quantity.
[Drawing 10] It is the mimetic diagram showing the table which specified the relation of the width of face of the above-mentioned preheating pulse and the temperature of a recording head which are used in the 1st example of the above.
[Drawing 11] It is the flow chart which shows the procedure of discharge quantity control explained by drawing 9 .
[Drawing 12] It is the top view showing the substrate which constitutes the recording head used in the 1st example of the above.
[Drawing 13] It is the typical wave form chart showing the relation of the table and division pulse which were shown in drawing 10 .
[Drawing 14] It is the block diagram showing the configuration of image data processing in the 1st example of the above.
[Drawing 15] It is the circuit block diagram showing the concrete configuration of the concentration unevenness test section shown in drawing 14 .
[Drawing 16] It is the block diagram showing the configuration of processing of the circuit shown in drawing 15 .
[Drawing 17] It is the mimetic diagram of gamma amendment table used by the processing shown in drawing 14 .
[Drawing 18] It is the mimetic diagram of memory showing concrete arrangement of the above-mentioned table.
[Drawing 19] It is the flow chart which shows the procedure of the concentration unevenness amendment processing performed in the 1st example of the above.
[Drawing 20] It is a mimetic diagram for explaining the read of the printing pattern in the above-

mentioned concentration unevenness amendment processing.
[Drawing 21] It is a mimetic diagram for explaining processing of the read data in the above-mentioned read.
[Drawing 22] It is a mimetic diagram for explaining processing of the read data in the above-mentioned read.
[Drawing 23] It is the diagram showing the data of the above-mentioned read.
[Drawing 24] It is the typical sectional view showing the head cartlidge concerning the 3rd example of this invention.
[Drawing 25] The above-mentioned head cartlidge is the typical sectional view showing the condition of having separated into the recording head and the ink tank.
[Drawing 26] It is the outline perspective view showing an example of the ink jet recording device using the above-mentioned head cartlidge.
[Description of Notations]
1 Regurgitation Heater
2 Ink Way
3 Delivery
5 Substrate
10A, 10B Temperature sensor
11A, 11B Incubation heater
314 IJC Head cartlidge
301 IJU Recording head
307 IT Ink tank
150 Control Section
151 CPU
152 RAM
126 EEPROM

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[Translation done.]

* NOTICES *



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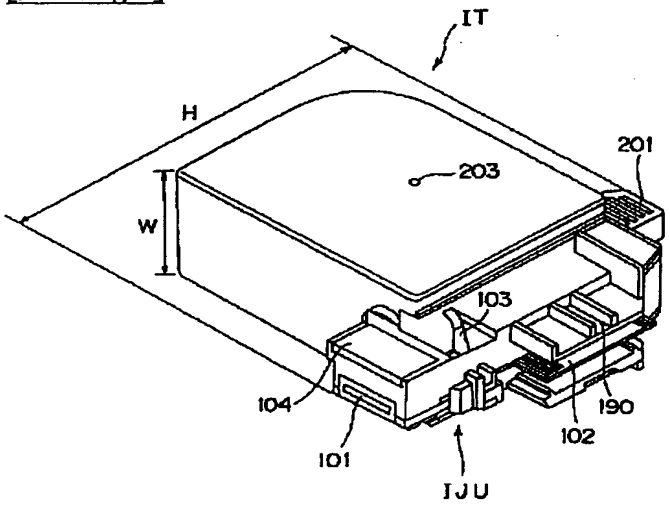
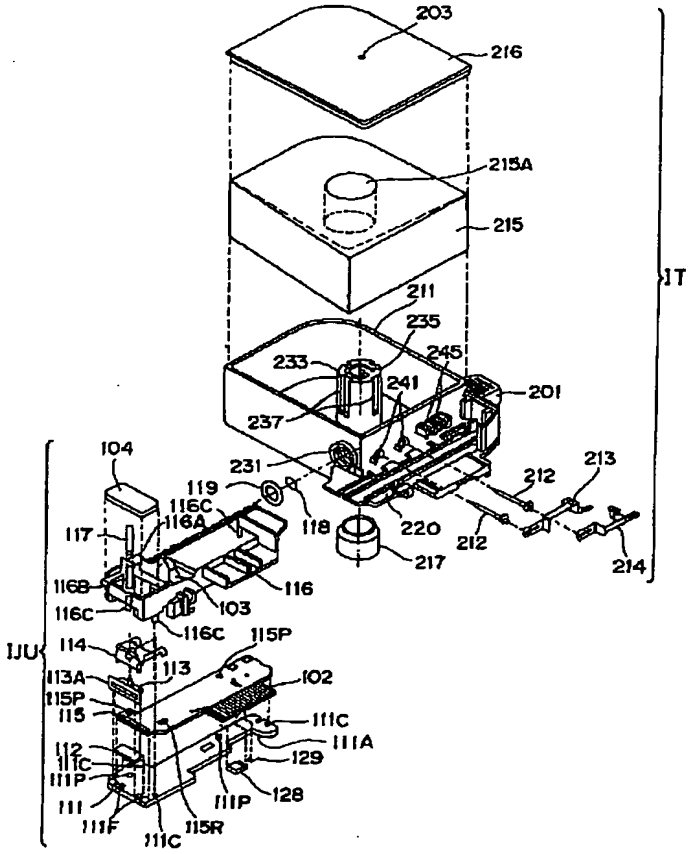
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

## DRAWINGS

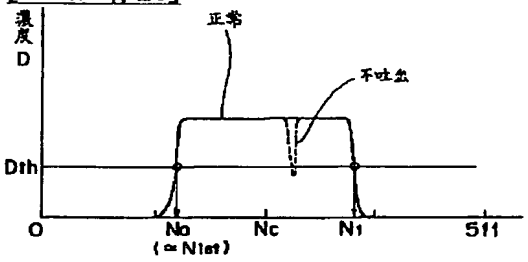
[Drawing 1]



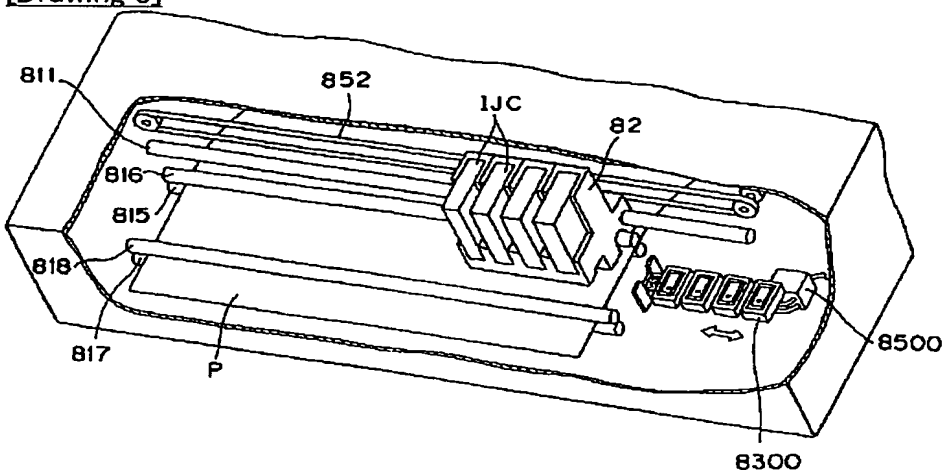

[Drawing 2]



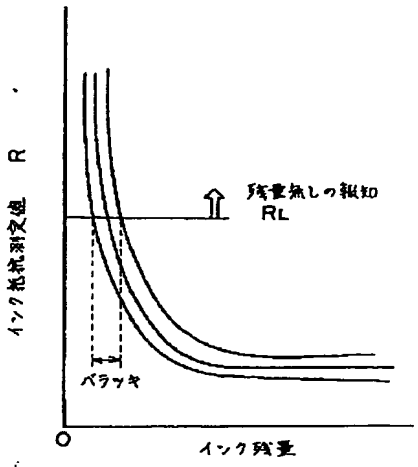

[Drawing 23]




[Drawing 3]




[Drawing 4]

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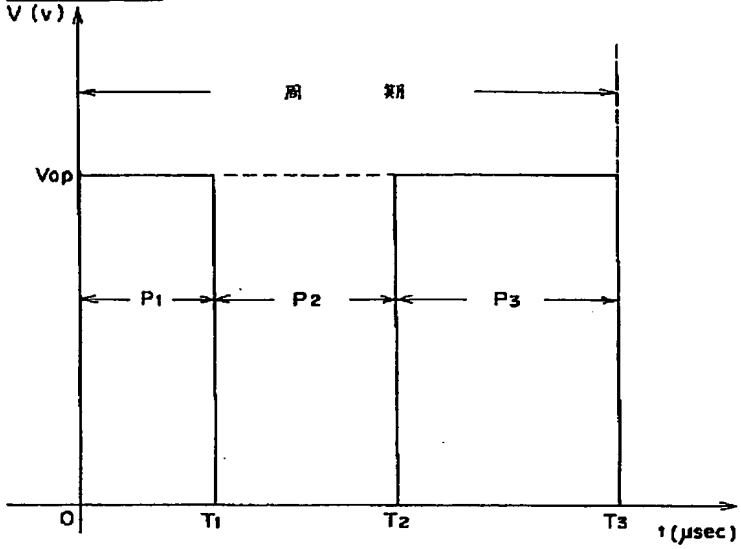


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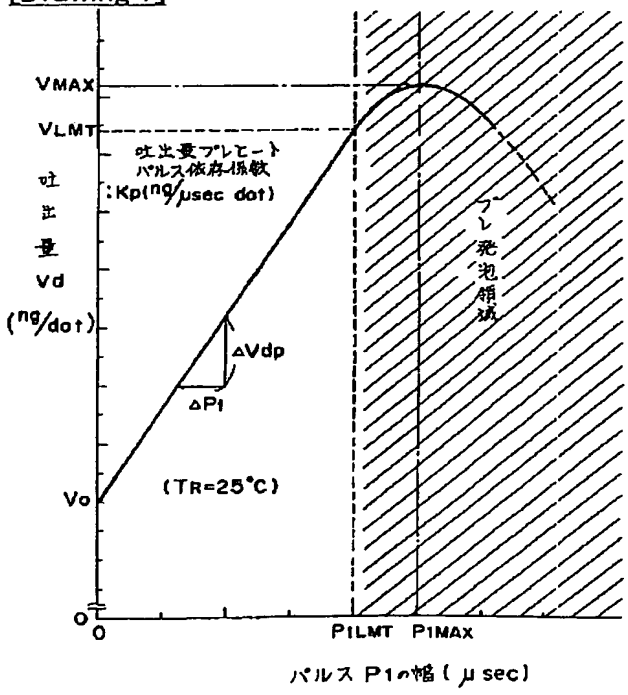
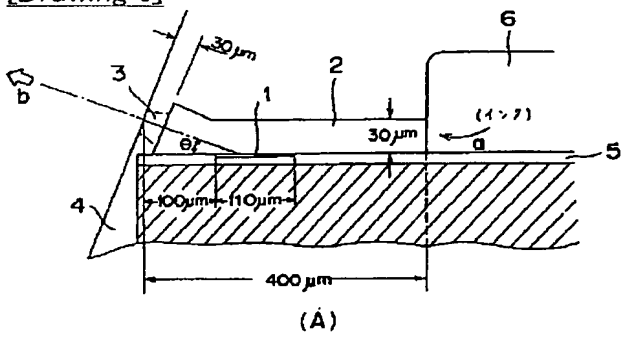


[Drawing 10]

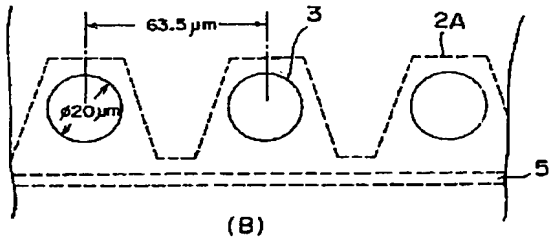
| 条件 Table NO. | ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ | ⑧ | ⑨ | ⑩ | ⑪ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ヘッド温度 TH (℃) | 26未満 | 26以上 28未満 | 28 ～ 30 | 30 ～ 32 | 32 ～ 34 | 34 ～ 36 | 36 ～ 38 | 38 ～ 40 | 40 ～ 42 | 42 ～ 44 | 44以上 |
| プレヒートPIのパルス幅 (Hex) | 0A | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |

1H = 0.187 ( μsec)

[Drawing 6]

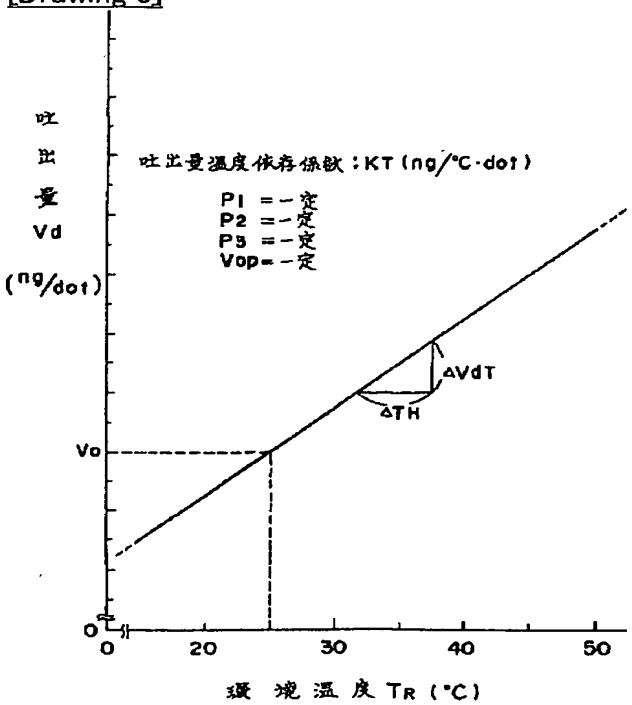



(A)

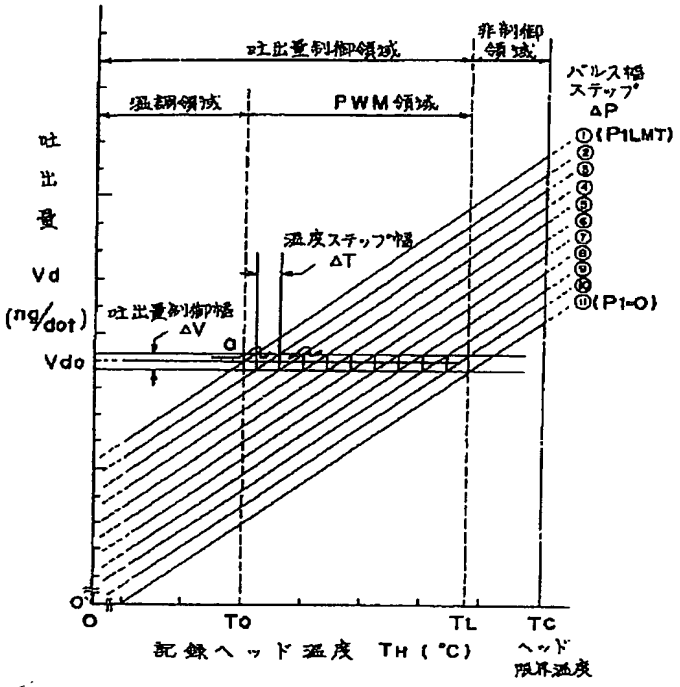



(B)

[Drawing 8]




[Drawing 9]

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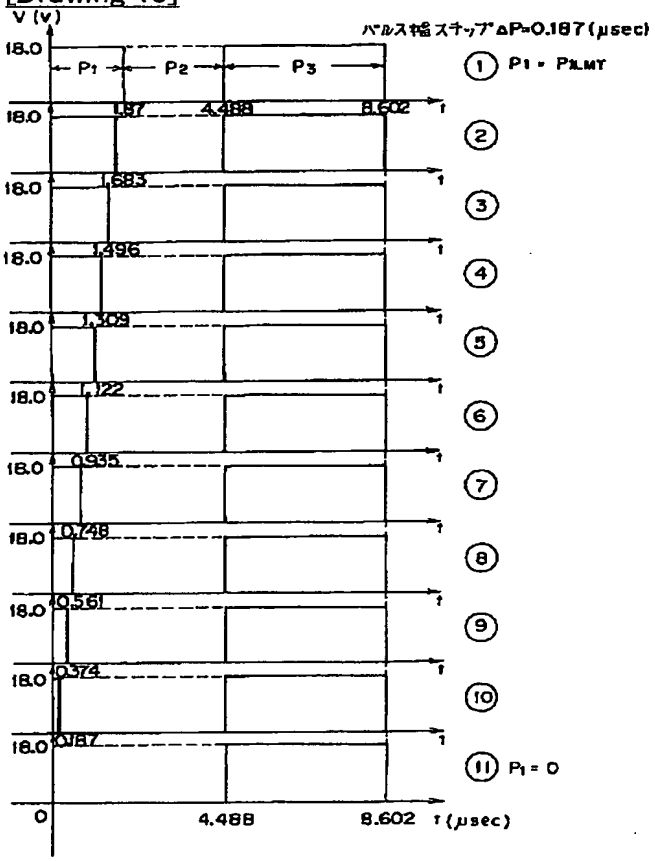


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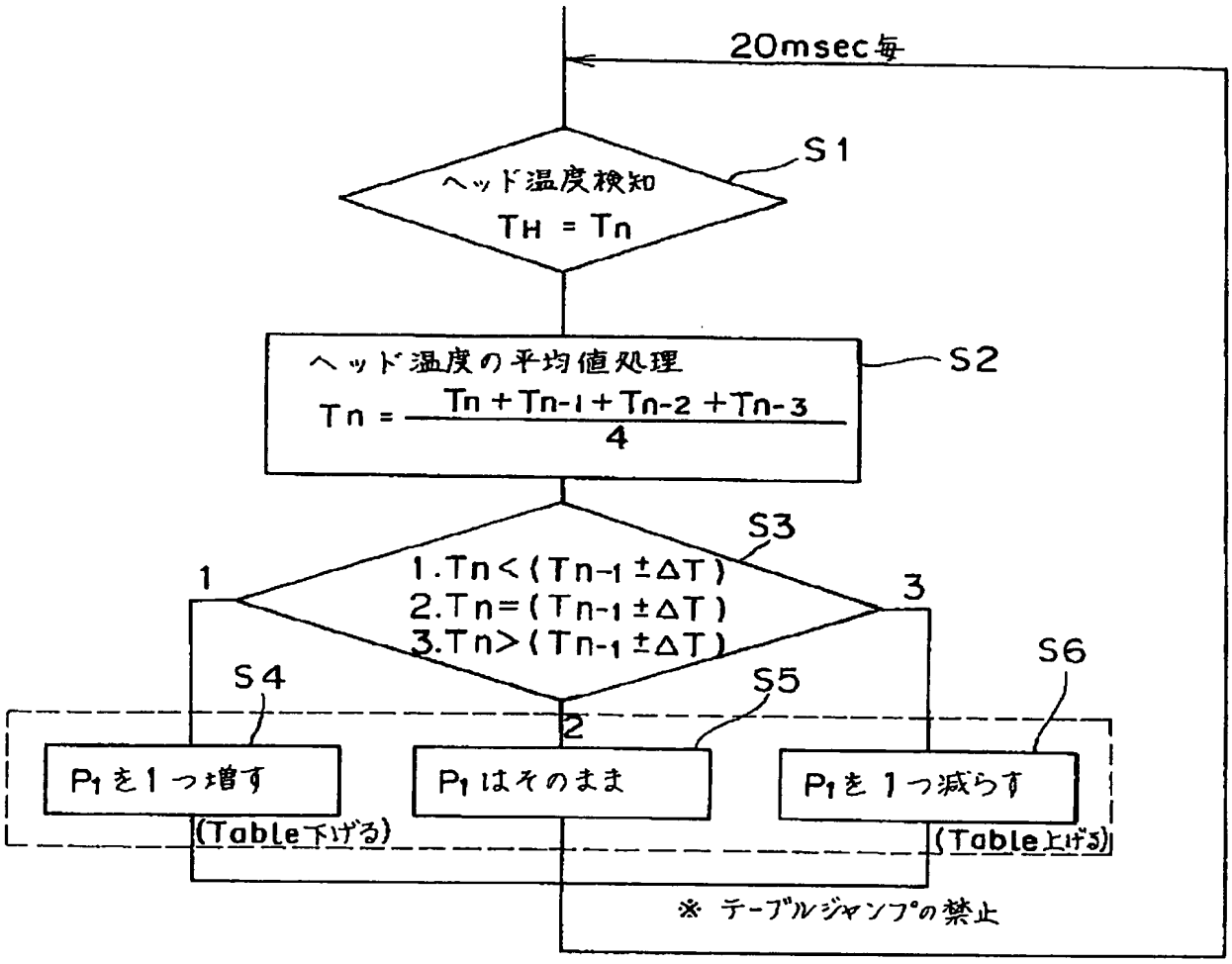


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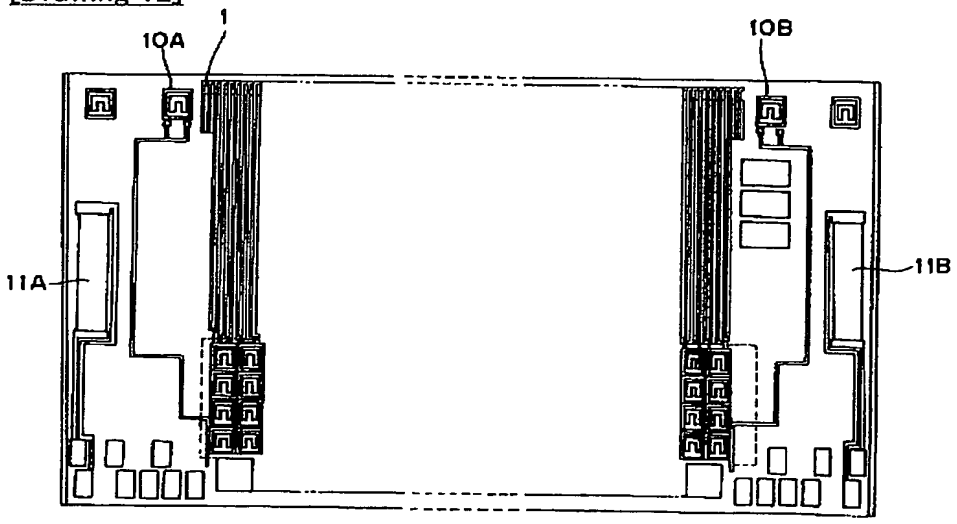


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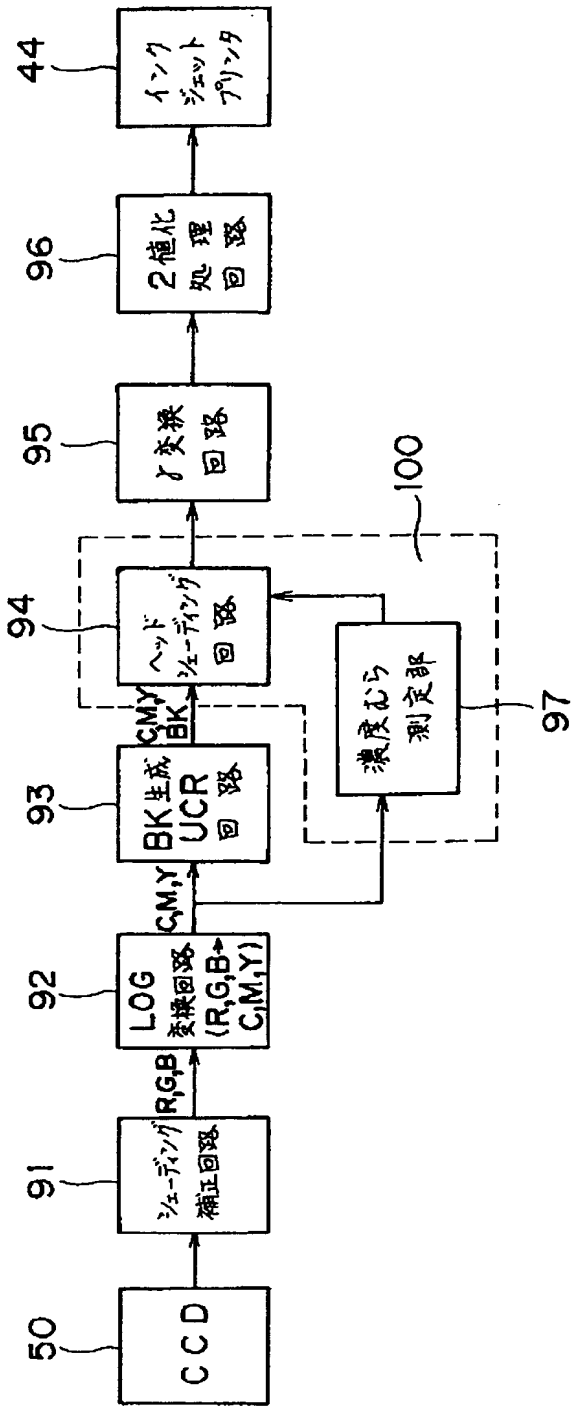
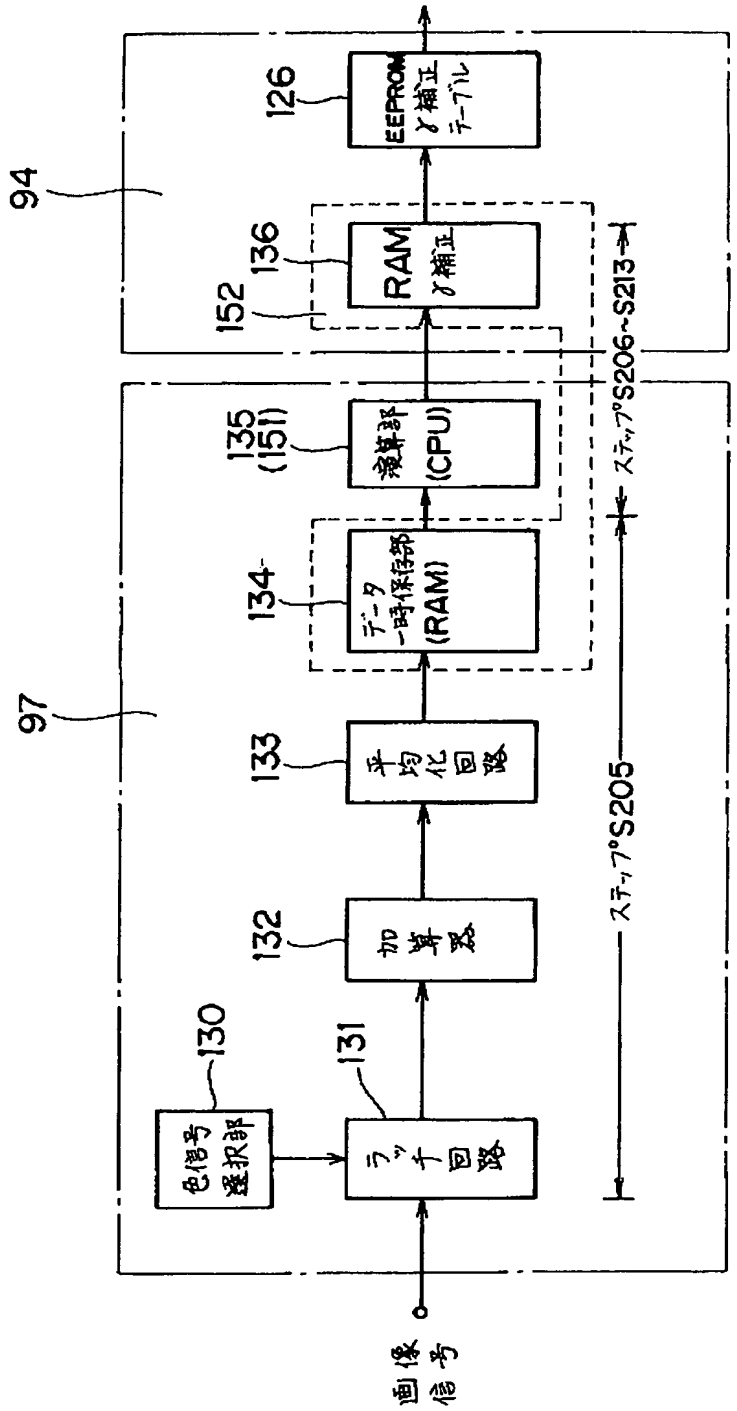
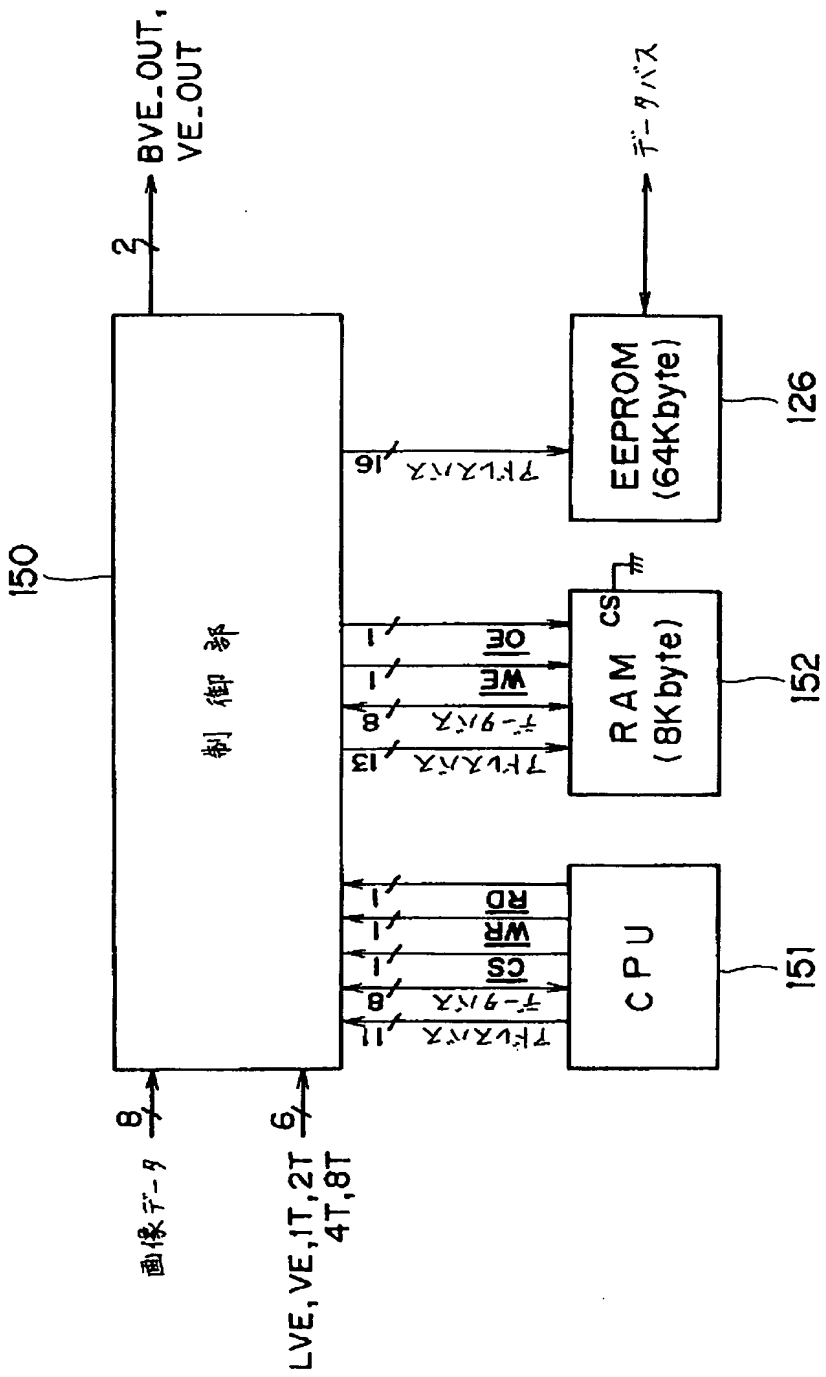

44
インクジェットプリンタ
96
2値化処理回路
95
γ変換回路
100
94
ヘッドシェーディング回路
C,M,Y
BK
93
BK生成UCR回路
C,M,Y
92
LOG変換回路(R,G,B→C,M,Y)
R,G,B
91
シェーディング補正回路
50
CCD
濃度むら測定部
97

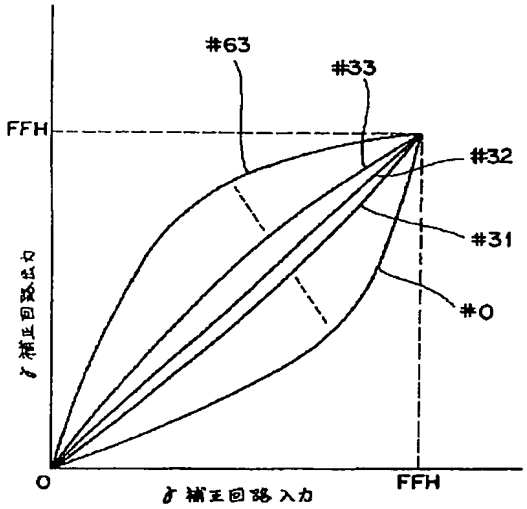
[Drawing 16]


94
126
EEPROM γ補正テーブル
152
136
RAM
γ補正
135
(151)
演算部
(CPU)
134
データ一時保存部
(RAM)
97
133
平均化回路
132
加算器
130
色信号選択部
131
ラッチ回路
画像信号
ステップS205
ステップS206~S213

[Drawing 15]


BVE_OUT,
VE_OUT
2
データバス
EEPROM
(64Kbyte)
126
16
アドレス
150
制御部
CS
RAM
(8Kbyte)
152
OE
WE
データ
8
アドレス
13
RD
WR
CS
データ
8
アドレス
11
CPU
151
8
画像データ
6
LVE, VE, 1T, 2T
4T, 8T

[Drawing 17]

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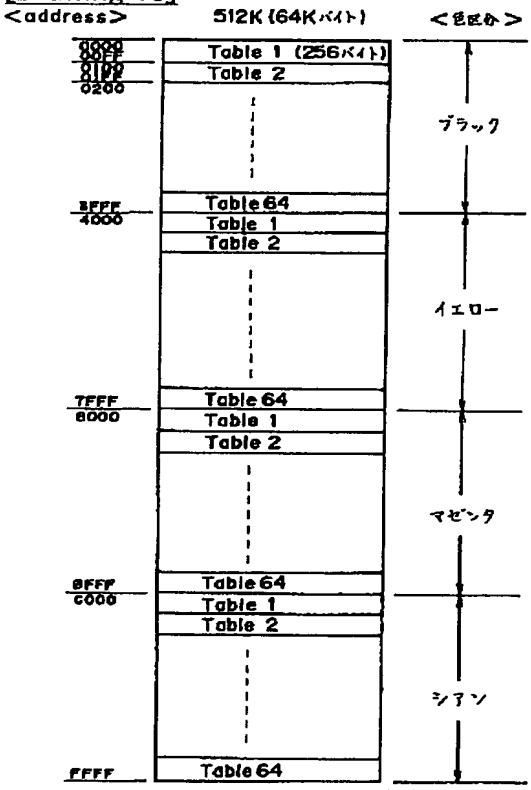
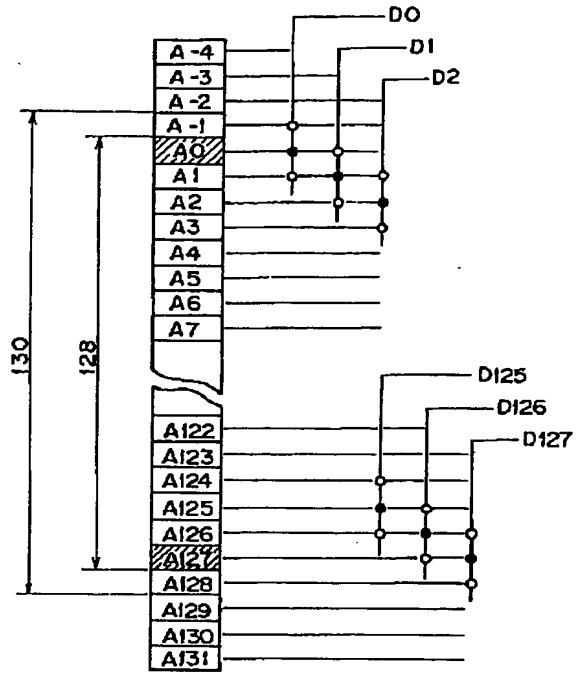
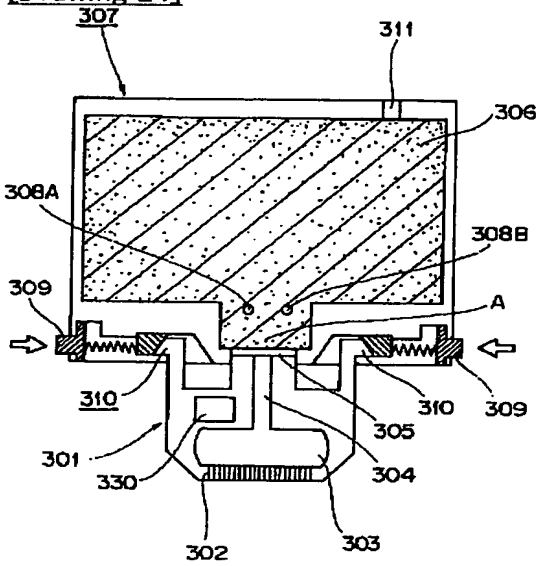


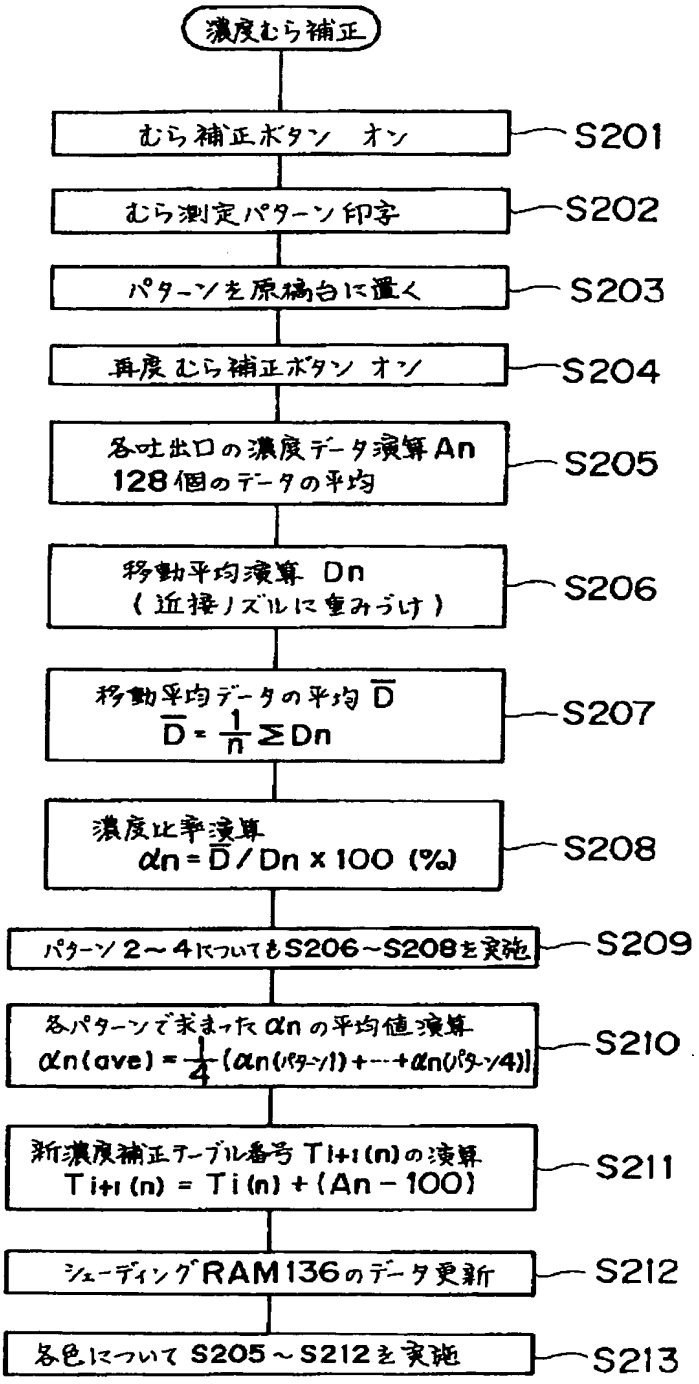

[Drawing 22]



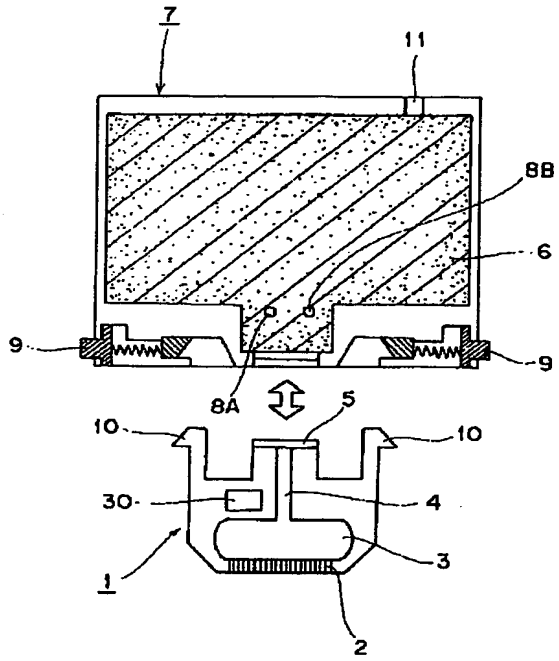

[Drawing 24]



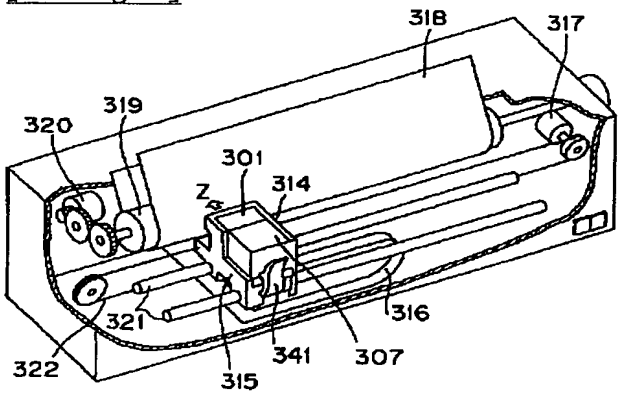

[Drawing 19]


濃度むら補正
むら補正ボタン オン
S201
むら測定パターン印字
S202
パターンを原稿台に置く
S203
再度むら補正ボタン オン
S204
各吐出口の濃度データ演算An
128個のデータの平均
S205
移動平均演算 Dn
(近接ノズルに重みづけ)
S206
移動平均データの平均 $\overline{D}$
$\overline{D} = \frac{1}{n}\Sigma Dn$
S207
濃度比率演算
$\alpha n = \overline{D} / Dn \times 100$ (%)
S208
パターン2~4についてもS206~S208を実施
S209
各パターンで求まったαnの平均値演算
$\alpha n(ave) = \frac{1}{4}\{\alpha n(パターン1) + \cdots + \alpha n(パターン4)\}$
S210
新濃度補正テーブル番号 Ti+1(n)の演算
Ti+1(n) = Ti(n) + (An - 100)
S211
シェーディングRAM136のデータ更新
S212
各色について S205~S212を実施
S213

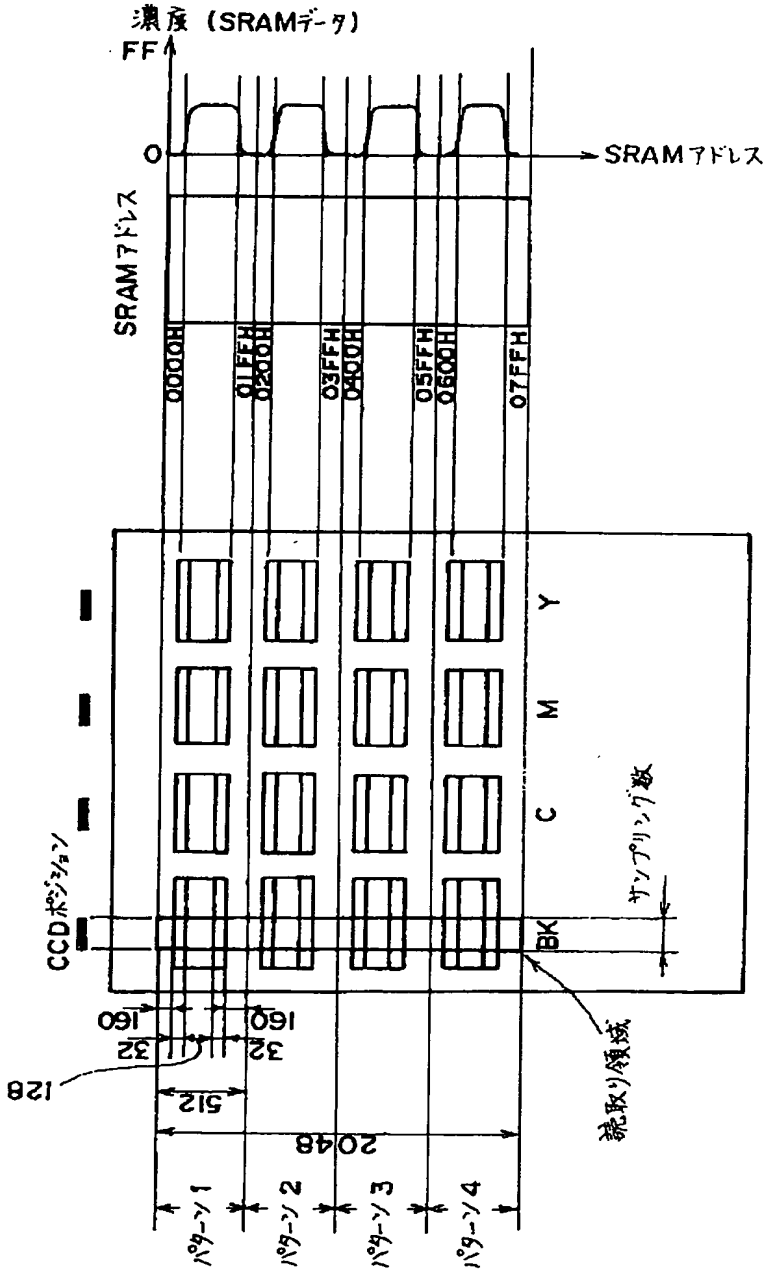
[Drawing 25]



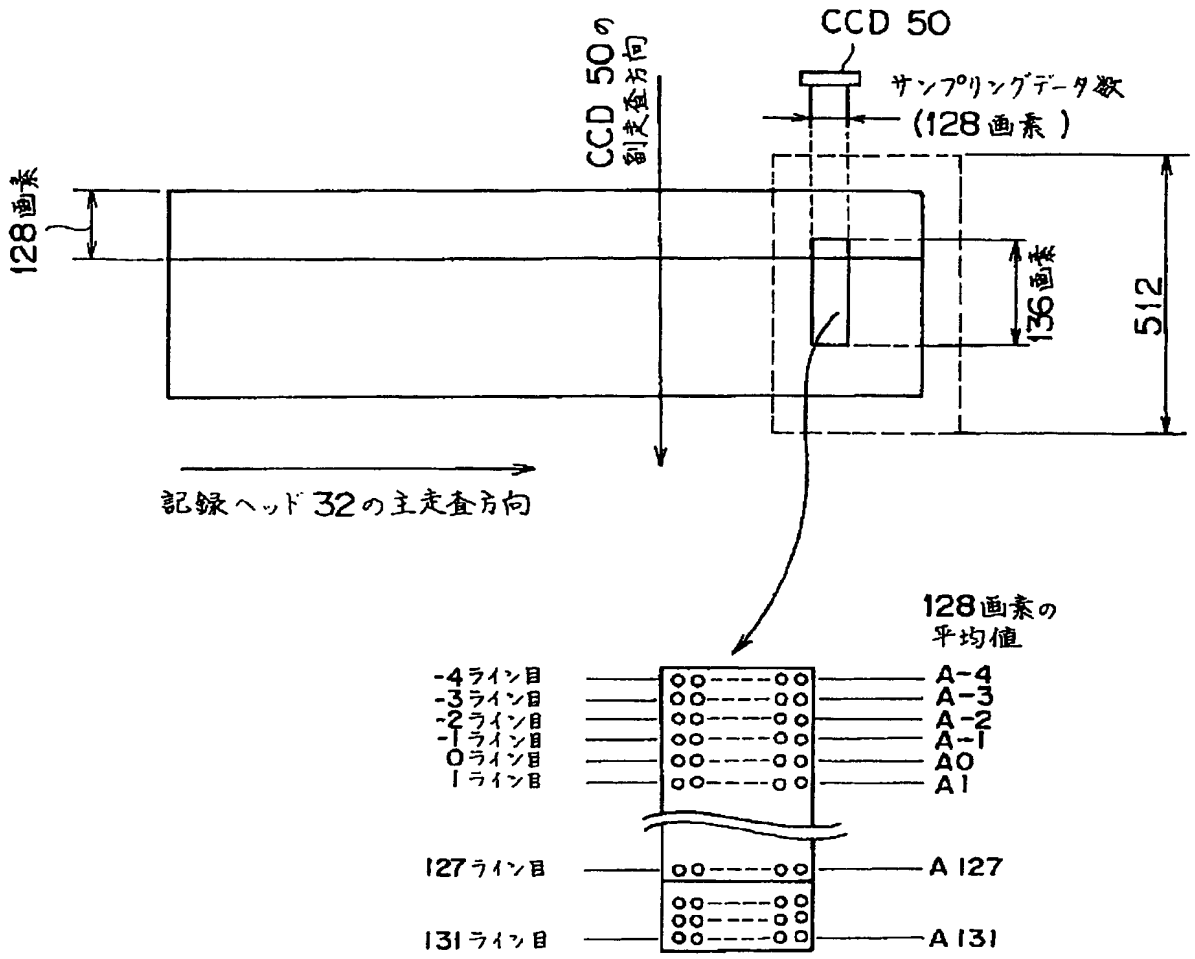

[Drawing 26]




[Drawing 20]


濃度（SRAMデータ）
FF
0
SRAMアドレス
SRAMアドレス
0000H
01FFH
0200H
03FFH
0400H
05FFH
0600H
07FFH
Y
M
C
BK
CCDポジション
サンプリング数
160
160
32
32
128
512
2048
読取り領域
パターン1
パターン2
パターン3
パターン4

[Drawing 21]




[Translation done.]

* NOTICES *



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CORRECTION OR AMENDMENT

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[Kind of official gazette] Printing of amendment by the convention of 2 of Article 17 of Patent Law
[Section partition] The 4th partition of the 2nd section
[Publication date] January 16, Heisei 13 (2001. 1.16)

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[Annual volume number] Open patent official report 6-3208
[Application number] Japanese Patent Application No. 5-114435
[The 7th edition of International Patent Classification]

B41J 2/05
2/01
2/175
2/12

[FI]

B41J 3/04 103 B
101 Z
102 Z
104 F

[Procedure revision]
[Filing Date] May 17, Heisei 12 (2000. 5.17)
[Procedure amendment 1]
[Document to be Amended] Specification
[Item(s) to be Amended] The name of invention
[Method of Amendment] Modification
[Proposed Amendment]
[Title of the Invention] The write-in approach of the data to the record material maintenance container with a storage means and this container with a storage means which supply record material to the Records Department of a recording device and this recording device
[Procedure amendment 2]
[Document to be Amended] Specification
[Item(s) to be Amended] Claim
[Method of Amendment] Modification
[Proposed Amendment]
[Claim(s)]
[Claim 1] In the recording device which records to recorded media,
With the Records Department which records to said recorded media
The record material maintenance container which has a storage means to memorize the time amount on which the time amount on which the time amount with which said recording device

was equipped, and said recording device recorded at the end, the time amount with which said recording device was equipped, or said recording device recorded at the end while holding the record material supplied to said Records Department, in order to record on said recorded media, The recording device characterized by having the write-in means which writes in said time amount to said storage means.

[Claim 2] Said storage means is a recording device according to claim 1 characterized by being a means to memorize the data for getting to know the residue of the record material in said record material maintenance container.

[Claim 3] Said record material maintenance container is a recording device according to claim 1 characterized by being the ink tank which holds ink as record material.

[Claim 4] Said Records Department is a recording device according to claim 1 to 3 characterized by making the ink as record material produce air bubbles using heat energy, and carrying out the regurgitation of the ink based on generation of these air bubbles.

[Claim 5] In the write-in approach of the data to the record material maintenance container holding the record material supplied to the Records Department of the recording apparatus which records to recorded media,

The write-in approach of the data to the record material maintenance container characterized by to make said storage means memorize the time amount on which the time amount on which the time amount with which said recording device was equipped, and said recording device recorded at the end, the time amount with which said recording device was equipped, or said recording device recorded at the end from the recording device with which said record material maintenance container was carried.

[Claim 6] The time amount with which said recording device was equipped is the write-in approach of the data to the record material maintenance container according to claim 5 characterized by being written in said storage means when said recording device is equipped with said record material maintenance container.

[Claim 7] The time amount on which said recording device recorded at the end is the write-in approach of the data to the record material maintenance container according to claim 5 characterized by being written in said storage means after record of said recording device.

[Claim 8] It is the write-in approach of the data to the record material maintenance container of account ** to claim 5 characterized by making the data for getting to know the residue of the record material in said record material maintenance container for said storage means memorize.

[Claim 9] Said record material maintenance container is the write-in approach of the data to the record material maintenance container according to claim 5 characterized by being the ink tank which holds ink as record material.

[Claim 10] Said Records Department is the write-in approach of the data to the record material maintenance container according to claim 5 to 9 characterized by making the ink as record material produce air bubbles using heat energy, and carrying out the regurgitation of the ink based on generation of these air bubbles.

[Claim 11] It is a record material maintenance container holding the record material with which a recording device is equipped and which is supplied to the record **** Records Department to recorded media,

This record material maintenance container is a record material maintenance container characterized by having a storage means to memorize the time amount on which the time amount on which the time amount by which said recording device was equipped with the record material maintenance container, and said recording device recorded at the end, the time amount with which said recording device was equipped, or said recording device recorded at the end.

[Claim 12] Said storage means is a record material maintenance container according to claim 11 characterized by being a means to memorize the data for getting to know the residue of the record material in said record material maintenance container.

[Claim 13] Said record material maintenance container is a record material maintenance container according to claim 11 characterized by being the ink tank which holds ink as record material.

[Claim 14] Said Records Department is a record material maintenance container according to

claim 11 to 13 characterized by making the ink as record material produce air bubbles using heat energy, and carrying out the regurgitation of the ink based on generation of these air bubbles.
[Procedure amendment 3]
[Document to be Amended] Specification
[Item(s) to be Amended] 0001
[Method of Amendment] Modification
[Proposed Amendment]
[0001]
[Industrial Application] This invention relates to the write-in approach of the data to the record material maintenance container with a storage means and this record material maintenance container with a storage means which supply record material to the Records Department of a recording device and this recording device.
[Procedure amendment 4]
[Document to be Amended] Specification
[Item(s) to be Amended] 0004
[Method of Amendment] Modification
[Proposed Amendment]
[0004] As a configuration which makes exchange of the above recording heads comparatively easy, there are what fabricated the recording head and the ink tank to one, a thing mutually made disengageable even if it was one, and it is the configuration which an ink jet recording device may be used for, and is adopted in recent years. Moreover, it may be exchanged like the case where the ink tank which supplies the ink which is record material to a recording head is a head.
[Procedure amendment 5]
[Document to be Amended] Specification
[Item(s) to be Amended] 0005
[Method of Amendment] Modification
[Proposed Amendment]
[0005]
[Problem(s) to be Solved by the Invention] By the way, when the recording head for which it was exchanged is already used as mentioned above, by the busy condition of the recording head till then etc., the regurgitation drive of the recording head by the body side of equipment does not suit, and the good ink regurgitation may be unable to be performed. For example, the heat generation characteristic may be changing with drives till then, or the property of the regurgitation heater of a recording head itself of having been exchanged in the regurgitation heater which generates the heat energy used for the ink regurgitation may be changing. In such a case, when the body side of equipment drove the regurgitation heater by the same driving pulse even as it, the good regurgitation was not performed, consequently the grace of a record image might be spoiled. Moreover, also in the case of the ink tank, the grace of a record image might be spoiled depending on the condition of the record material currently held inside.
[Procedure amendment 6]
[Document to be Amended] Specification
[Item(s) to be Amended] 0006
[Method of Amendment] Modification
[Proposed Amendment]
[0006] Especially the place that this invention is made in view of an above-mentioned technical problem, and makes into the purpose is storing the time amount concerning the situation of record material in the record material maintenance container for holding the record material supplied to the Records Department, such as a recording head, and is to offer the write-in approach of the data to the recording apparatus, the record material maintenance container, and the record material maintenance container which enable good record.
[Procedure amendment 7]
[Document to be Amended] Specification
[Item(s) to be Amended] 0007

[Method of Amendment] Modification
[Proposed Amendment]
[0007]
[Means for Solving the Problem] this invention — therefore, in this invention, the recording device which records to recorded media is characterized by providing the following. The Records Department which records to said recorded media The record material maintenance container which has a storage means to memorize the time amount on which the time amount on which the time amount with which said recording device was equipped, and said recording device recorded at the end, the time amount with which said recording device was equipped, or said recording device recorded at the end while holding the record material supplied to said Records Department, in order to record on said recorded media The write-in means which writes in said time amount to said storage means In the write-in approach of the data to the record material maintenance container holding the record material supplied with another gestalt to the Records Department of the recording apparatus which records to recorded media From the recording device with which said record material maintenance container was carried, the time amount on which the time amount with which said recording device was equipped, and said recording device recorded at the end, the time amount with which said recording device was equipped, or said recording device is characterized by making said storage means memorize the time amount which recorded at the end. It is a record material maintenance container holding the record material with which a recording device is equipped and which is supplied to the record **** Records Department to recorded media with still more nearly another gestalt. This record material maintenance container The time amount on which the time amount by which said recording device was equipped with the record material maintenance container, and said recording device recorded at the end, the time amount with which said recording device was equipped, or said recording device is characterized by having a storage means to memorize the time amount which recorded at the end.
[Procedure amendment 8]
[Document to be Amended] Specification
[Item(s) to be Amended] 0008
[Method of Amendment] Modification
[Proposed Amendment]
[0008]
[Function] According to the above configuration, by reading above-mentioned time amount from the storage means of a record material maintenance container, even if exchanged in a record material maintenance container, the condition of the record material in this record maintenance container can be known.
[Procedure amendment 9]
[Document to be Amended] Specification
[Item(s) to be Amended] 0010
[Method of Amendment] Modification
[Proposed Amendment]
[0010] Example 1
Drawing 1 starts one example of this invention, and the example of 1 configuration of the record head cartlidge which constituted in one the recording head and the above-mentioned ink tank as a record material maintenance container which constitute the discharge Records Department for the ink as record material is shown. The cartridge concerning this example has the ink tank unit IT and the head unit IJU in one, and these can be mutually detached and attached now. The wiring connector 102 for outputting an ink residue detection signal, while receiving the signal for driving the ink discharge part 101 of a head unit etc. is formed in the location on a par with the head unit IJU and the ink tank unit IT. Therefore, in the posture taken when the below-mentioned carriage is loaded with this cartridge, while being able to make that height H low, thickness of a cartridge can be formed into a thin form. When arranging a cartridge side by side so that this may mention later per drawing 3, it is possible to constitute carriage small. In wearing on the carriage of a head cartlidge, the tongue 201 which established the discharge part

101 in the ink tank unit IT in the condition of having turned down can be grasped, and it can arrange on carriage. This tongue 201 engages with the lever prepared in the below-mentioned carriage for performing wearing actuation of a cartridge. And the pin prepared in the carriage side at the time of the wearing engages with the pin engagement section 103 of the head unit IJU, and positioning of the head unit IJU is made.

[Procedure amendment 10]
[Document to be Amended] Specification
[Item(s) to be Amended] 0068
[Method of Amendment] Modification
[Proposed Amendment]
[0068] When a power source is switched on, the table number TA 1 is read in EEPROM128 which the recording head mentioned above as drive conditions with an ID number, a color, etc. The Maine heat pulse P3 of the division Pulse-Density-Modulation drive controlling method later mentioned by the body side according to this number TA 1 The value of width of face is read.

[Procedure amendment 11]
[Document to be Amended] Specification
[Item(s) to be Amended] 0074
[Method of Amendment] Modification
[Proposed Amendment]
[0074] i) Decision of THS
HS data are calculated by performing diameter distribution measurement of a dot of each head on standard drive conditions on the production process of a head beforehand, and what table-ized the count result is made to memorize as ROM information on a head.

[Procedure amendment 12]
[Document to be Amended] Specification
[Item(s) to be Amended] 0077
[Method of Amendment] Modification
[Proposed Amendment]
[0077] (PWM table set up) It carries out similarly about a setup of the PWM table used by the PWM control mentioned above.

[Procedure amendment 13]
[Document to be Amended] Specification
[Item(s) to be Amended] 0095
[Method of Amendment] Modification
[Proposed Amendment]
[0095] Next, as shown in drawing 22, it asks for the moving average Dn of 3 pixels which includes 1 pixel for every delivery by CPU approximately (step S206). However, the method of the average in this case may be a total of 9 pixels in average which contains 4 pixels approximately, and may give weight **** further to each pixel. Next, the average of the 3-pixel average for which it asked at step S206 is calculated (step S207). Next, ratio alphan of the 3-pixel each average for which it asked at step S206, and the value calculated at step S207 It asks for [%] (n is a delivery number and is 128 or less [ 1 or more ]) (step S208).

[Procedure amendment 14]
[Document to be Amended] Specification
[Item(s) to be Amended] 0133
[Method of Amendment] Modification
[Proposed Amendment]
[0133] Example 2
Although the example 1 mentioned above memorized the time amount by which EEPROM as a storage means was prepared in the recording head (therefore, a thing ink tank called this), and this was equipped with the recording head and ink tank of these one about the case where the ink tank as a recording head and a record material maintenance container which constitutes the Records Department is constituted by one, this example is related when a recording head and an ink tank are disengageable cartridges. EEPROM as a storage means is separately prepared also

in the ink tank as a record material maintenance container, and the time amount by which this was equipped with the ink tank is memorized.

[Procedure amendment 15]
[Document to be Amended] Specification
[Item(s) to be Amended] 0141
[Method of Amendment] Modification
[Proposed Amendment]
[0141] The data write-in contents to EEPROM which is the storage means formed in the ink tank as a record material maintenance container, timing, and each effectiveness are listed as a table below. The body side of a recording apparatus gets to know the time amount by which equipment was equipped with the ink tank from such written-in data, and an ink tank can be based also on being carried out in exchange etc., and it can know correctly the condition of the ink which is record material.
[Procedure amendment 16]
[Document to be Amended] Specification
[Item(s) to be Amended] 0147
[Method of Amendment] Modification
[Proposed Amendment]
[0147] The example of reference
Unlike an example 2, this example has storage memory only by the recording head side, and the case where there is nothing to an ink tank side is shown.
[Procedure amendment 17]
[Document to be Amended] Specification
[Item(s) to be Amended] 0190
[Method of Amendment] Modification
[Proposed Amendment]
[0190]
[Effect of the Invention] Even if exchanged in a record material maintenance container, according to this invention, the condition of the record material in this record maintenance container can be known by reading above-mentioned time amount from the storage means of a record material maintenance container, so that clearly from the above explanation.
[Procedure amendment 18]
[Document to be Amended] Specification
[Item(s) to be Amended] drawing 24
[Method of Amendment] Modification
[Proposed Amendment]
[Drawing 24] It is the typical sectional view showing the head cartlidge concerning the example of reference of this invention.

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[Translation done.]